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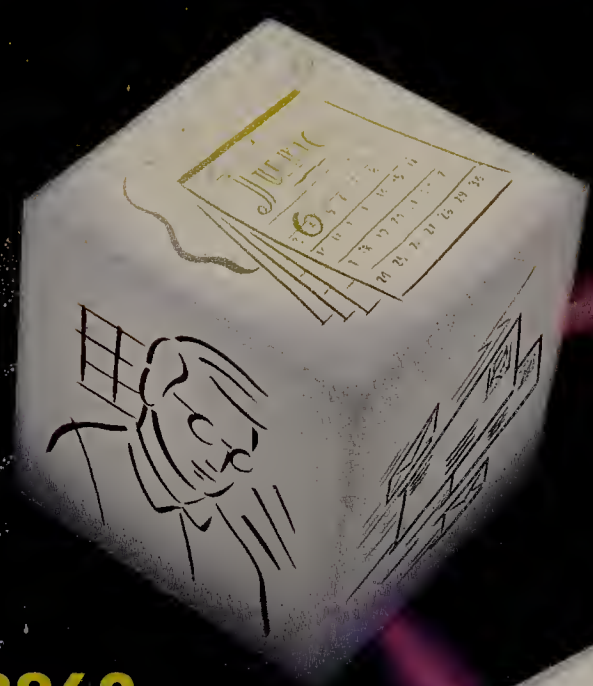

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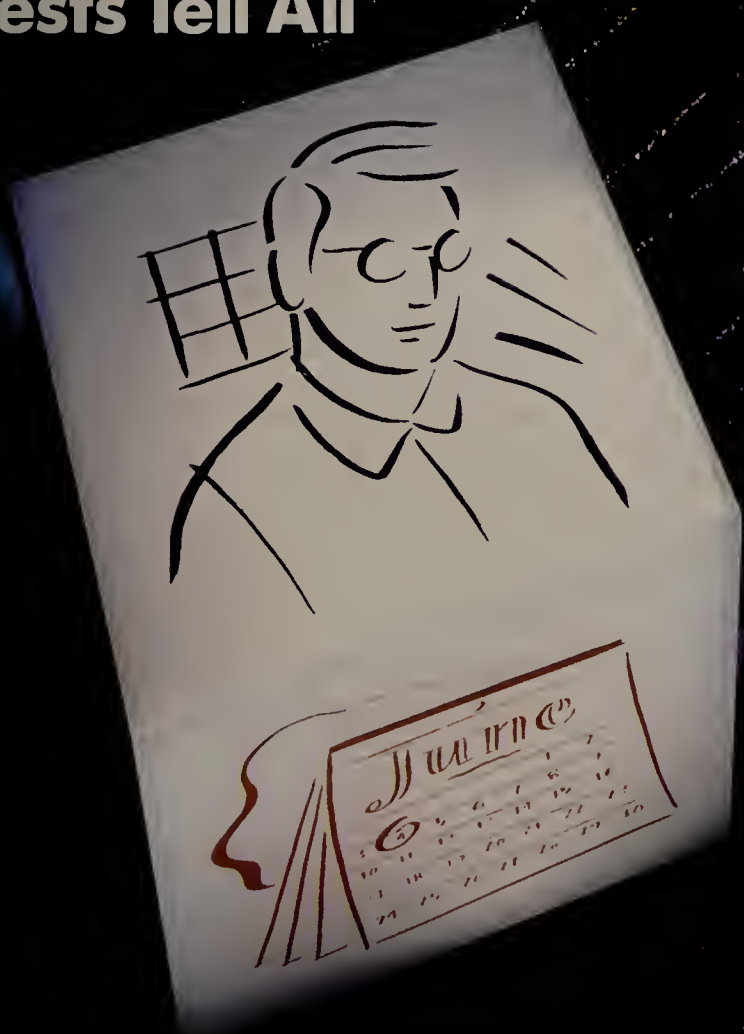

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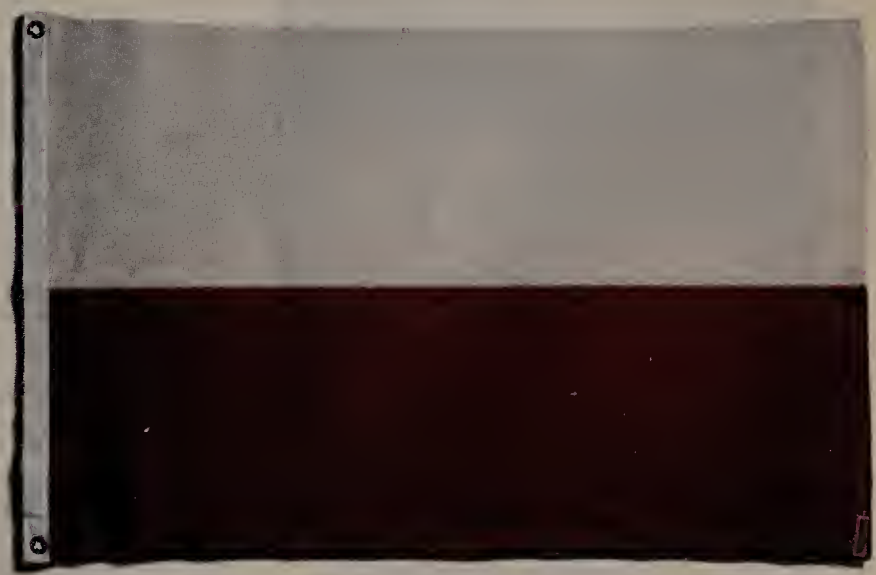

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PC MAGAZINE EDITOR'S CHOICE 2·14·89

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PC MAGAZINE EDITOR'S CHOICE 3·13·90

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- Page mode interleaved memory architecture.
- LIM 4.0 support for memory over 640 KB.
- Integrated diskette and high performance 16-bit VGA video controller on system board.
- Socket for Intel 80287 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Integrated high peformance hard disk interface on system board.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
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40 MB VGA Monochrome System	$1,799
40 MB VGA Color Plus System	$2,099

Prices listed reflect 512 KB of RAM. 640 KB versions of the above systems are available for an additional $50, 1 MB versions for an additional $150, and 2 MB versions for an additional $300.
80 and 100 MB hard drive configurations also available.

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- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 25 MHz Intel 80387 or 25 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard drive controller.
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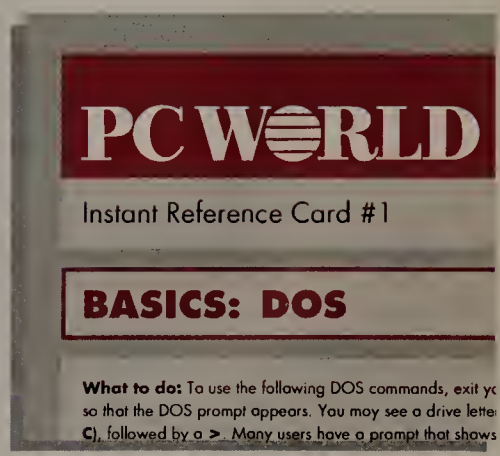

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The Business Magazine of PC Products and Solutions

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(MOST PC USERS WANT TO TORTURE THE INVENTOR OF DOS.)

Aren't computers supposed to make life simpler?

Do you get royalties from all those How to Use DOS books?

WHY BACKSLASHES?

Why, after six revisions, hasn't DOS been simplified?

Do all your sentences start with C:?

Did it ever occur to you that normal people might use DOS?

Was your father a dentist, or do you...?

How many times have you seen the words Bad Command?

Is your entire vocabulary limited to words of eight letters or less?

How much money do you think Corporate America has wasted on DOS training?

DID DOS ACTUALLY MAKE SENSE TO YOU, OR DID YOU JUST RUN OUT OF TIME?

WE JUST WANT TO ASK HIM A FEW QUESTIONS.

What would DOS have been like if you could run applications, format floppies, and copy, view, move or delete files and directories with a single keystroke? How would people have felt about DOS if all the commands were in English instead of in a foreign language?

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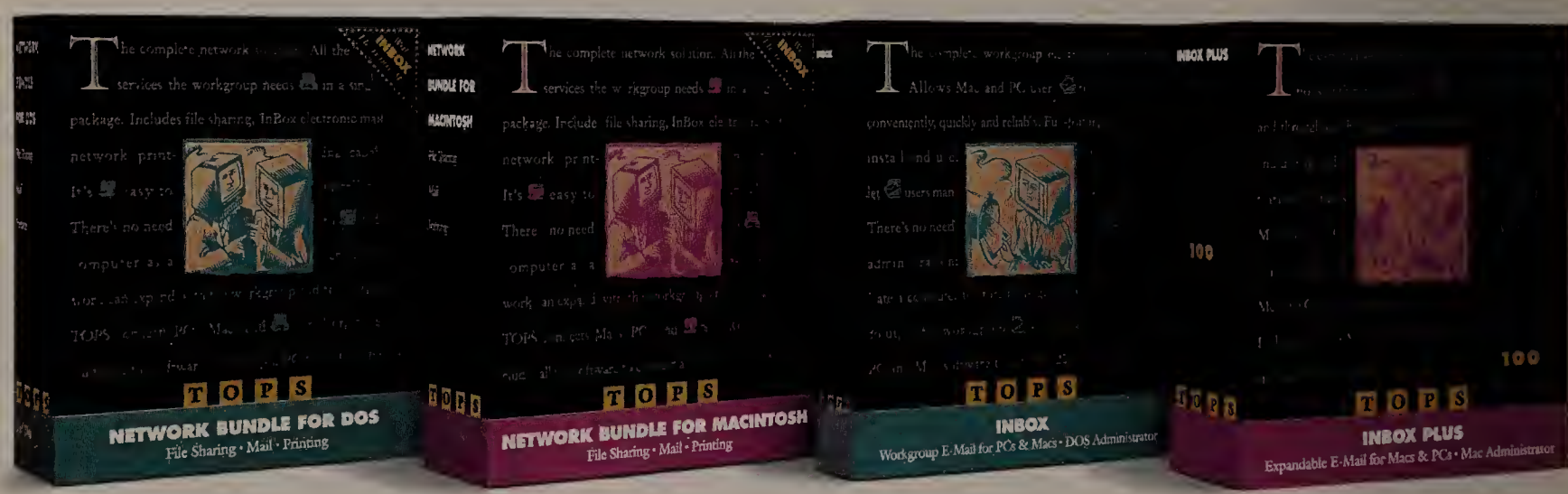

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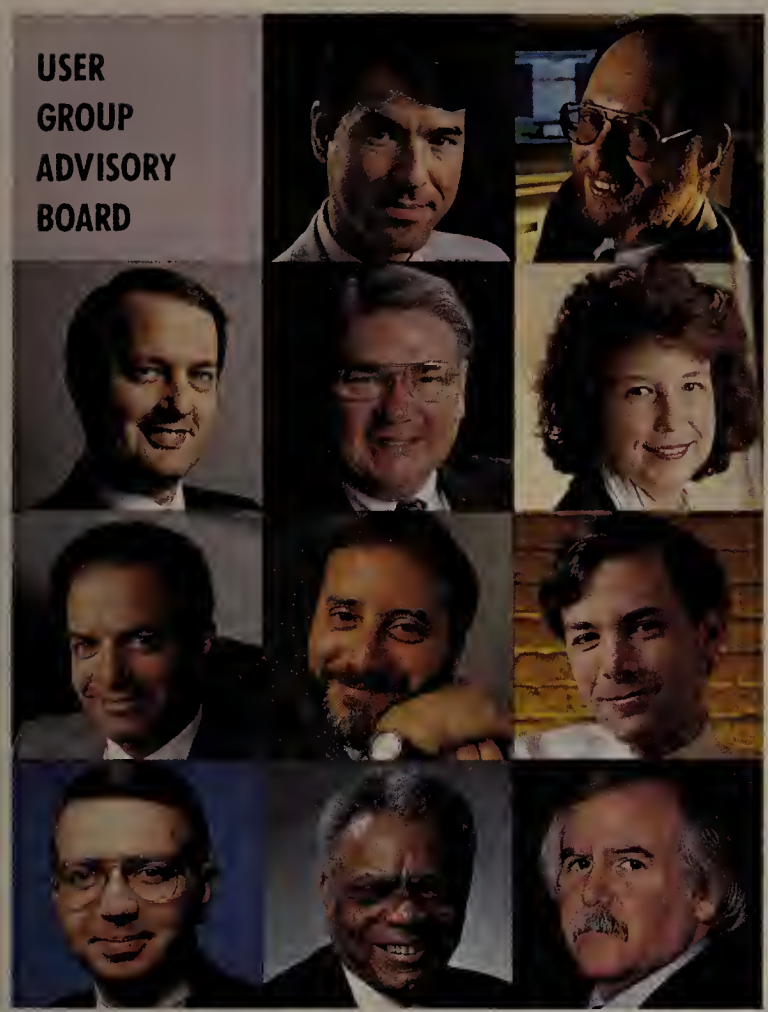

PC World's User Group Advisory Board: Top row, Tony Barcellos, Sacramento PC Users Group; Steve Bass, Pasadena IBM Users Group. Second row, Roger Bender, Microcomputer Managers Association (MMA); Jack Bolton, Atlanta PC Users Group; Mary Dolce, Chicago Computer Society. Third row, Al Harrison, HAL-PC; David Hoffman, New York PC Users Group (NYPC); Dan Lavin, PC World User Ombudsman. Bottom row, Brian Livingston, MMA; Irving Samuels, Capital PC User Group; Jerry Schneider, Association of PC User Groups. Not pictured: Brian Camenker, Boston Computer Society; Joseph Rigo, NYPC.

O Pioneers!

When you work with the latest computer technology, it's natural to feel like a pioneer. And the pioneers are easy to spot, says Editor in Chief Richard Landry: "They're the ones with the arrows in their backs."

For most users—those of us who can't afford to be pioneers—the PC landscape, with its bewildering array of choices and compromises, is a vast no-man's-land. That's why we're happy to have *PC World*'s User Group Advisory Board riding scout for us. Formally and informally, the members of the board speak for the silent majority of computer users. Most have been helping new users master DOS since the earliest days of the IBM PC; that sort of experience keeps *PC World* focused on the issues that users really care about.

In recent months, you've seen direct evidence of user group involvement in these pages. Our April Buyers' Guide, for example, listed the best utilities for *1-2-3* and *Excel*, as voted by worksheet wizards from some of the country's top user groups. But user group concerns indirectly influence every article we publish.

User Ombudsman Dan Lavin (himself a user group veteran) was instrumental in assembling the panel. Formally, the group meets with our top editors every six months, but we ask for feedback on specific issues throughout the year. The number one qualification for membership on the board? That's easy, says Lavin: "Be a leader in the user community. Members have to know the PC community and the group that they represent."

The board is a varied bunch, Lavin reports. "Steve Bass, from Southern California's Pasadena IBM Users Group, is a family therapist. Jerry Schneider, who represents the Association of PC User Groups, is a consultant. Al Harrison, from Houston's HAL-PC, is a lawyer who specializes in computer issues. But all the members have three things in common. First, they volunteer large amounts of time in the user community. Second, they're all computer users, which means they're the ones who suffer from industry goofs and prosper from industry successes. Finally," notes Lavin, "as we found out, they all have strong opinions about the computer industry."

If you're serious about computing, there are plenty of good reasons to join a user group. The help you get from an experienced special-interest group goes far beyond what you get from tech support lines. User group newsletters offer some of the liveliest writing in the industry. And if you order through a user group, you qualify for a special discount on your *PC World* subscription.

Don't know where to look? Keep watching this space. In August, we'll publish our 1990 directory of user groups. Chances are, you'll find a group that can help make that no-man's-land feel like home.

Ed Bott

Ed Bott
Managing Editor

TOP ROW: MARC LONGWOOD, FREDRICH CANTOR; SECOND ROW: ANDY FREEBERG, MARILYN FUTTERMAN, MICHAEL ABRAMSON; THIRD ROW: RICHARD LOPER, ANDY FREEBERG, SETH RESNICK; BOTTOM ROW: ANDY FREEBERG, LARRY GLATT, COURTESY JERRY SCHNEIDER

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LOTUS BUYING NOVELL

Software Behemoth Will Challenge Microsoft, but Many Analysts Don't See Underlying Logic

Lotus and Novell have agreed to merge, creating a software giant large enough to dispute Microsoft's charter in network software. A one-for-one stock swap, scheduled for completion in July, gives Lotus all Novell stock in return for approximately $1.4 billion worth of its own. Novell continues as an independent subsidiary under chief executive Ray Noorda, who becomes vice chairman of Lotus. The surprise move grew out of extensive cooperation on marketing and technical support for the complementary products, explains Lotus chairman Jim Manzi. Novell gains access to Lotus's corporate accounts in return for allowing Lotus access to NetWare value-added resellers. On a grander scale, the new $985 million company will challenge $953 million Microsoft in next-generation distributed applications and underlying network technology. The new Lotus "will have a strong impact on setting direction for the industry," maintains Salomon Brothers analyst Michelle Preston. But other analysts question the synergies that Lotus and Novell promise, worry about wildly conflicting corporate cultures, and wonder why Novell didn't receive a premium for its stock. Outsiders say the firm has been quietly shopped around during the past year. Although it shows solid profits and enjoys a 52 percent share of network operating system sales, Novell's prospects may be clouded. NetWare is losing the battle among corporate application developers to Microsoft's *LAN Manager* and IBM's *LAN Server*, insists David Marshak of Patricia Seybold's Office Computing Group. Meanwhile, independent software vendors worry that they will have to show future network applications to both Microsoft and Lotus, who remain the leading application suppliers.

New $985 million firm will rival $953 million Microsoft.

LEADING EDGE REVIVES

Backed by Korean Giant Daewoo, PC Supplier Has New Management and New Products

After spending most of 1989 in Chapter 11 reorganization, Leading Edge Products has reemerged as a subsidiary of Daewoo Corporation, hoping to regain some of its former popularity through new distributors, new PCs, and a new bankroll. Leading Edge was literally bought out of hock late last year by the $22 billion Korean manufacturer of its PCs, which has since invested more than $50 million. The Westborough, Massachusetts, firm has hired a new management team headed by president Albert Agbay. In April, the restructuring was rewarded by a $50 million–plus deal with super-distributor Softsel/Microamerica. "Leading Edge products have always sold; the problem had been with the old management and its dealings with the dealers," says John Conners, executive vice president of sales at Softsel/Microamerica. Leading Edge hopes to renew its relationship with its 800,000-plus customer base with a $5 million marketing campaign for an expanded product line. Products now range from the 8088-based Model D to the 25-MHz 386-based Model D3/25. By year-end the line will be augmented with a 286 notebook, diskless PCs, and network servers. Leading Edge also has hired its first vice president for technical services and invested half a million dollars in a spare-parts facility. The 100-employee firm hopes to go into the black this year, although Daewoo won't demand profits until 1992. "Thank God Daewoo has a lot of money," Agbay comments. But IDC analyst Bruce Stephen suggests that "Leading Edge will have a tough time, just because it's fairly late in the game and this is not a high-growth market anymore."

GORDON STUDER

HAYES REDUCES

Company Cuts 25 Percent of Work Force, Refocuses on Most Profitable Products

Moving to streamline operations and refocus the product line, Hayes Microcomputer Products has given pink slips to 150 employees, roughly 25 percent of its work force. President Dennis Hayes calls this move a "strategic reduction in force" resulting from a general industry slowdown, global pricing pressure, and unlicensed copying of its technology. He refuses to comment on profits, but insists that unit shipments are rising and that revenues "continue to be good." Eric Arnum, telecommunications analyst for International Resource Development, believes that if you ignore recently acquired subsidiaries, Hayes revenues are running at about the $120 million rate that they reached in 1985. Hayes seems to hold a lock on brand-conscious users who buy their modems at the same time as their PCs. But Arnum says Hayes is under attack at the low end, where there are 122 brand names for 2400-bps modems alone, most coming out at razor-thin profit margins. Last fall Hayes cut 60 midlevel managers and slashed prices by as much as 43 percent. While current dismissals are across the board, Hayes promises technical support won't suffer. All announced products will ship, but some R&D projects will be scratched. Other projects, like an Integrated Services Digital Network effort, whose payoff isn't coming as quickly as anticipated, are being significantly reorganized.

NEWWAVE CATCHES ON WITH WINDOWS DEVELOPERS

Hewlett-Packard's Environment Draws Both Backers and Some Tough Competition

Gaining the admiration of application developers, Hewlett-Packard's *NewWave* environment also may be gaining a powerful competitor via new programming extensions from Microsoft that give *Windows* and OS/2 some of *NewWave*'s object management capabilities. More than two dozen applications such as Samna's *Ami Professional* word processor now rely on *NewWave*'s object-management facility to turn bits of data and application code into objects that users can move between files just by clicking on and moving their on-screen icons. These links are live, so data can be simultaneously updated in multiple files and applications launched from files, although RAM requirements may soar to 6MB. The first PC implementation of *NewWave* is built on *Windows* (see "Windows on the Corporation," *Windows Special Report*, May 1990). But Microsoft has yet to back up its endorsement of *NewWave* with products. Microsoft OS/2 evangelist Viktor Graebner downplays the object-oriented *Windows* extensions his company is circulating among developers, saying that they give OS/2 and *Windows* only very limited *NewWave* functionality. But others say Microsoft has lessened its commitment to *NewWave* for various reasons, including the desire to control a promising system technology. "It has a lot to do with the 'not-invented-here' syndrome," says one developer. The issue may come to a head with *Excel*'s next release, which Microsoft has promised to make *NewWave*-aware. But analysts and developers describe that promise as little more than lip service. "There was something deeper going on that Microsoft backed away from," says Jonathan Yarmis, vice president of PC services for The Gartner Group. "Our relationship with Microsoft is very complex as far as *NewWave* is concerned," says HP developer manager Mike Webb. "[Microsoft] is our partner/competitor/customer."

WORDPERFECT JOINS ALLIANCE

Firm Won't Be Acquired but Will Work With Lotus and Novell to Enhance Technical Support

Immediately after the Lotus/Novell merger was made public, Novell chairman Ray Noorda sparked rumors that Lotus also would acquire word processing giant WordPerfect by noting that the Lotus/Novell deal began with discussions among the three companies on how to enhance technical support. WordPerfect president Allan Ashton, who owns the overwhelming majority of stock, says flatly that his company isn't interested in merging. But all three firms are clearly concerned about the power that the Microsoft/IBM axis wields over their applications and plan to cooperate more closely. Last year, Lotus and WordPerfect began sharing technical data on their Presentation Manager packages in order to reduce differences in their command sets and ease the exchange of live data across the applications. The goal, says Ashton, is to ensure that the companies "have a major say" in the direction of Presentation Manager development. The trio plans to increase sharing of development and support information and cross-training of staff. Ashton dislikes Noorda's suggestion of a single support number, although he adds that WordPerfect already answers technical questions on *1-2-3* and NetWare, even helping network users configure their systems. He pledges there will be continued cooperation on support but says that combining his 600-person support staff with those of the other firms would disrupt the close cooperation between WordPerfect technical support and product design. WordPerfect fields as many as 13,000 calls a day.

IBM RESHUFFLES DEVELOPMENT

As OS/2 Effort Is Reorganized, Big Blue Quietly Boosts Windows Applications

Reacting to lagging development and acceptance of OS/2, IBM has restructured its OS/2 team—and after years of distancing itself from *Windows*, it has quietly broadened its work on applications for Microsoft's graphical environment. Responsibilities have been realigned among Microsoft and IBM's three major OS/2 development centers. Outsiders say that IBM's Hursley, England, lab, which led the Presentation Manager effort and was the strongest lobbyist against *Windows*, will fill a smaller role. However, IBM PC software head Lee Reiswig denies that. Reiswig also contradicts reports that Microsoft will play a larger part in developing OS/2 Standard Edition so that IBM can concentrate on its Extended Edition. IBM's DOS group in Boca Raton, Florida, has been renamed the DOS/Windows group, but Reiswig says this does not indicate a major *Windows* initiative. However, last November's agreement with Microsoft about *Windows'* role is bearing fruit in IBM applications. The giant supplier realizes that "*Windows* is an important and necessary step between DOS and OS/2," says Micrografx chairman Paul Grayson. "It's incredible how much *Windows* development IBM is doing," adds Mark Zachmann, chairman of Z-Soft. "*Windows 3.0* is just a very good program; all the customers like it and are beating down IBM's door." Among early results, not only is IBM's Desktop Software Group starting to pump out *Windows* packages, but a *Windows* front end is expected for the *OfficeVision* environment. "What they've done with DOS in *OfficeVision* isn't acceptable, and their customers aren't satisfied," explains Judith Hurwitz of Patricia Seybold's Office Computing Group.

IBM has quietly broadened its development of Microsoft Windows applications.

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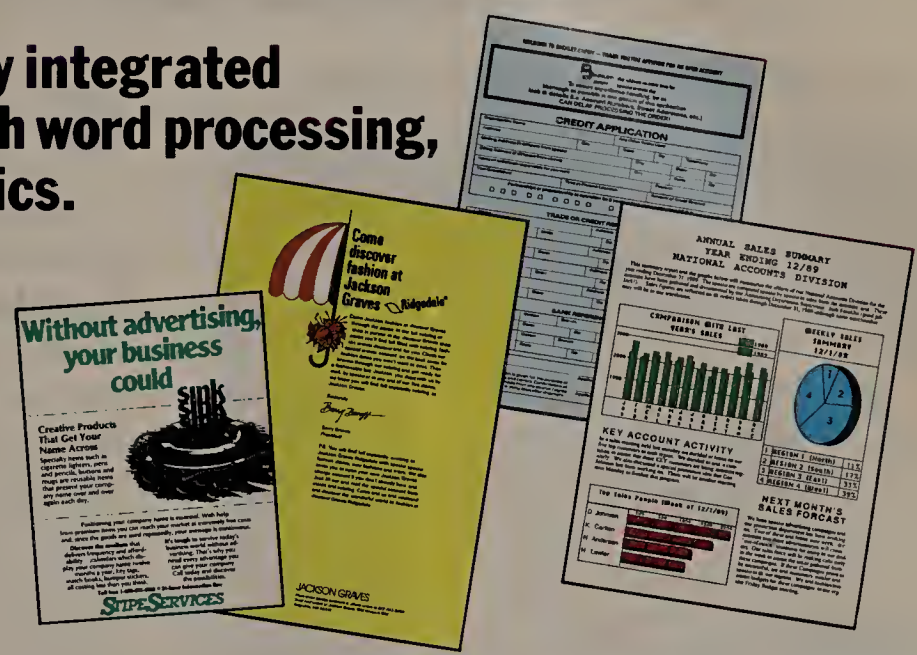

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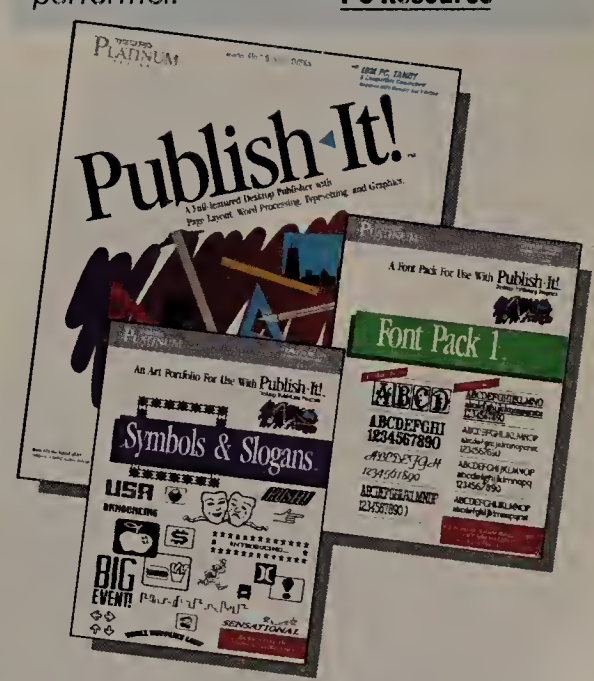

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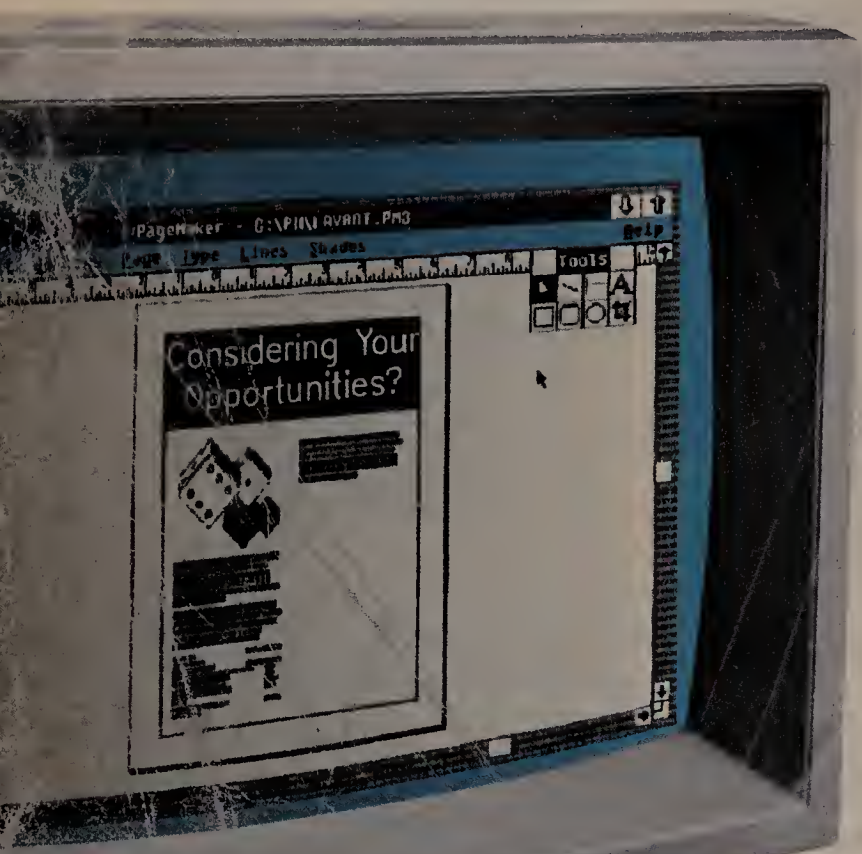

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Takes the wait out of Windows!

Circle 83 on reader service card

It's No Fun Being Number One

Now it's Lotus's turn to try setting standards without making everyone mad.

Richard Landry

They say you never really understand someone until you walk a mile in their shoes. Pretty soon, the folks at Lotus will find out if that's true. Lotus got everyone's attention recently with its surprise purchase of network giant Novell. The merger turns Lotus into the biggest PC software vendor around—bigger even than archrival and former top gun Microsoft. The deal also makes Lotus the undisputed market leader in two software areas that dominate today's offices and are likely to continue do so in the future—spreadsheets and network operating systems (see *Top of the News* in this issue).

It's the leader's job to set the standards that the rest of us live by. Under IBM's umbrella, Microsoft has made DOS the operating system standard for over 40 million PCs so far. On the Macintosh, Microsoft is the application leader with best-selling programs like *Excel, Word, Powerpoint,* and *Microsoft Mail.* And by marrying these strengths in operating systems and applications, Microsoft is pushing aggressively to set standards for the next generation of graphical, network-oriented software. Products like *LAN Manager, SQL Server,* and, most important, *Windows* express a technical vision of how tomorrow's PCs should work.

But it's just this kind of vision that gets Microsoft into hot water with other software developers—and that's why being number one isn't always so much fun. Microsoft earns low marks from many in the software community for using its position as operating system vendor (in which it's supposed to act impartially in the interests of all developers) to give itself an unfair advantage in the applications arena (where its customers become its toughest competitors). *Windows* is a case in point. Many vendors accuse Microsoft of having misled them with rosy forecasts of OS/2's success even while it was hard at work assembling an arsenal of software designed for the much-rumored *Windows 3.0.* And with all its development dollars riding on OS/2, it's no surprise that Lotus has been at the vanguard of Microsoft's detractors.

For the marriage of Lotus and Novell to succeed, Lotus is going to have to step forward and claim the role that comes with being number one.

Now that the shoe's on the other foot, Lotus will discover for itself what it's like to set the standard for operating systems while being a big player in applications. Already, Lotus holds the lead in network applications with its powerful new package, *Notes* (see "Work Group Software Worth Waiting For" in this issue). But Lotus acknowledges that *Notes* isn't yet for everybody because networks still are not quite up to the task of handling ambitious group-productivity software. When the time comes to fill in the network operating system cracks that make promising programs like *Notes* hard to use, will Lotus take special advantage of its situation? The industry rumor mill is alive with such speculation.

But rumors don't matter. For the marriage of Lotus and Novell to succeed, Lotus is going to have to step forward and claim the role that comes with being number one. The world of network software is just starting to heat up, as this month's review of eight top groupware packages demonstrates. PC software vendors need someone to set standards that will let them build complex applications to unite workers in different parts of a company or different parts of the globe. By doing what it has to do—asserting a vision of the way computers can be best used in the office, and building the technology to make that vision possible—Lotus will inevita-

(continues)

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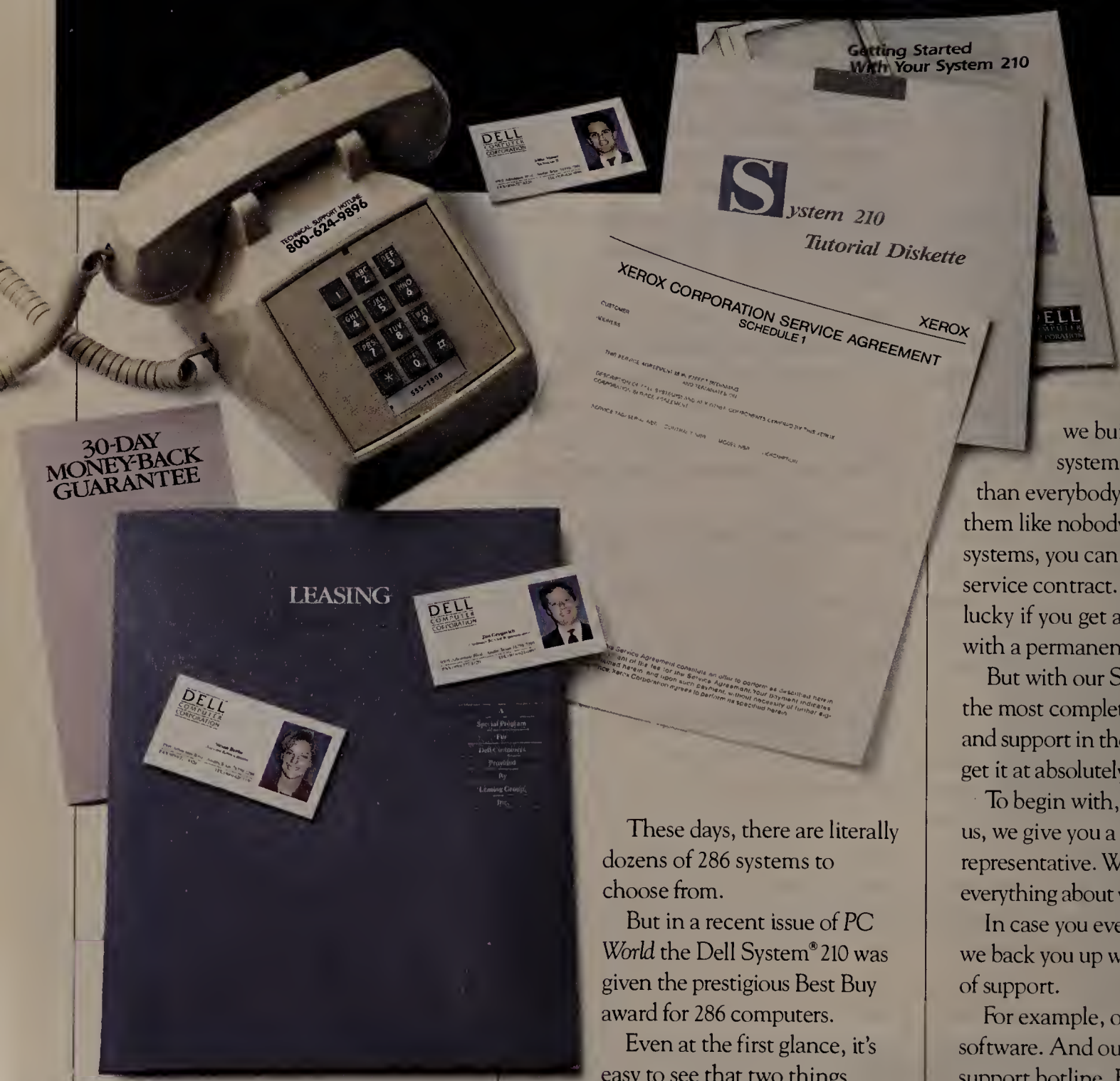

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   - ☐ 386™-based systems
   - ☐ 386SX-based systems
   - ☐ 486™-based systems
   - ☐ UNIX®-based systems
   - ☐ Laptops
   - ☐ Other: _____

2. Are you interested in computer products for:
   ☐ Home ☐ Business ☐ Resale

3. How many PC's does your company plan to purchase in the next twelve months?

Quantity	Timeframe	Quantity	Timeframe
_____	Less than 1 month	_____	6-12 months
_____	1-3 months	_____	More than 12 months
_____	3-6 months		

4. What do you plan to use computer products for?
   _____
   _____
   _____

5. How many PC's do you have installed now at your company? _____

6. Are you interested in leasing?
   ( ) Yes ( ) No

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Prices listed reflect 512 KB of RAM. 640 KB versions of the above systems are available for an additional $50. 1 MB versions for an additional $150 and 2 MB versions for an additional $300.

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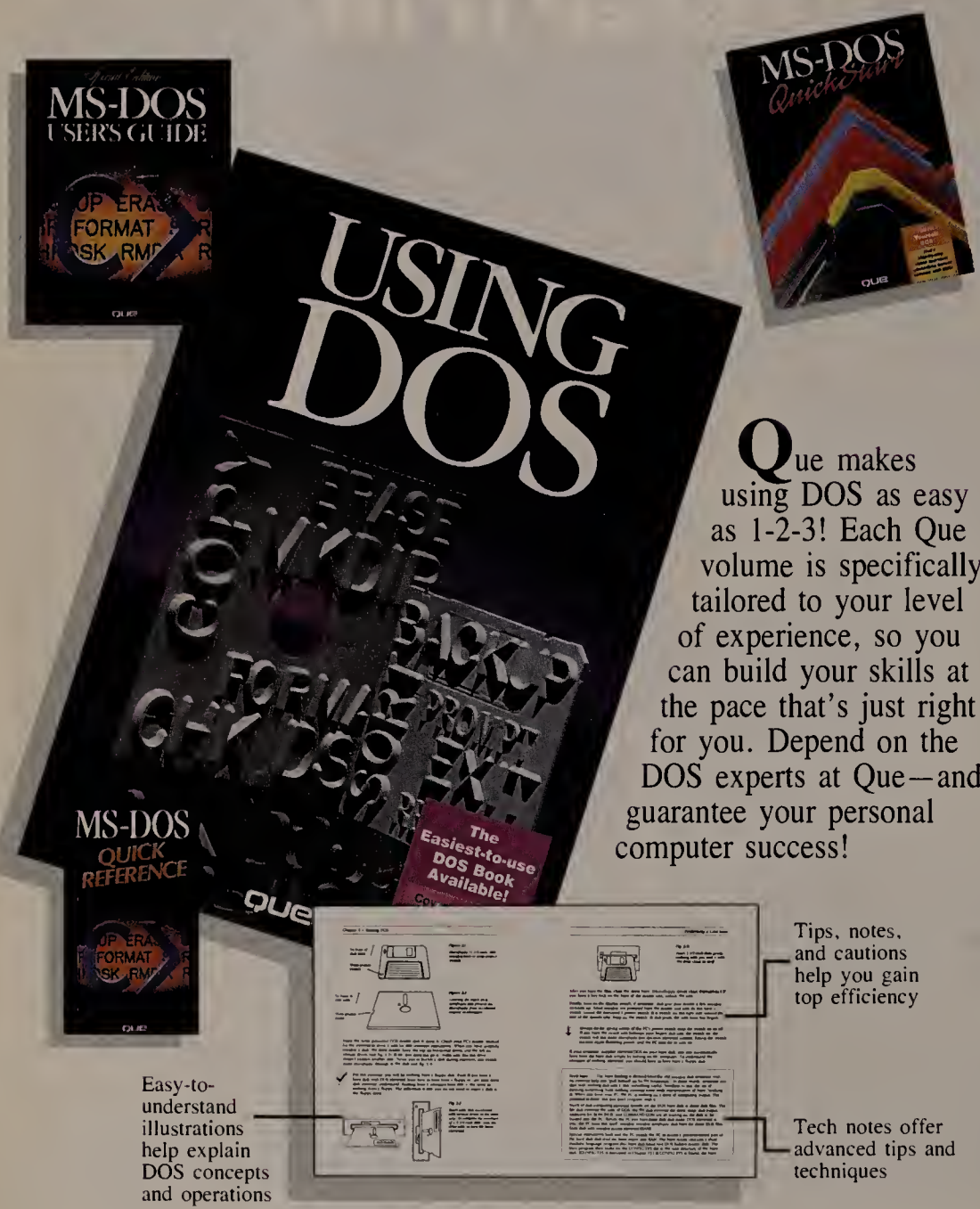

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You can see your votes reflected in the expanded "How To" section we launched last month. This month, we're introducing some important changes that you requested in our "Review" section, along with a new, brighter format designed to make the magazine easier to read.

We know that you're spending more time than ever reading *PC World.* Things are getting harder, not simpler, where personal computers are concerned. Now to get a quick picture of how *PC World* rates the products in a roundup, you can turn to the revamped Executive Summary that anchors every review. It's your guide to the criteria we use when selecting products that merit a Best Buy. Note, too, that articles include more figures, photos, and sidebars to make your reading more efficient and enjoyable. Finally, don't forget to check out the Instant Reference Card at the back of the magazine. This month you'll find a treasure trove of DOS commands printed on a conveniently sized card you can keep by your desk. In future months, we'll provide Instant Reference Cards for many top applications, starting with *WordPerfect* and *1-2-3.*

Please let me know if there are any other ways we can serve you better. Write to me at *PC World,* 501 Second St., San Francisco, CA 94107; fax 415/442-1891; MCI Mail Richard Landry/301-3685.

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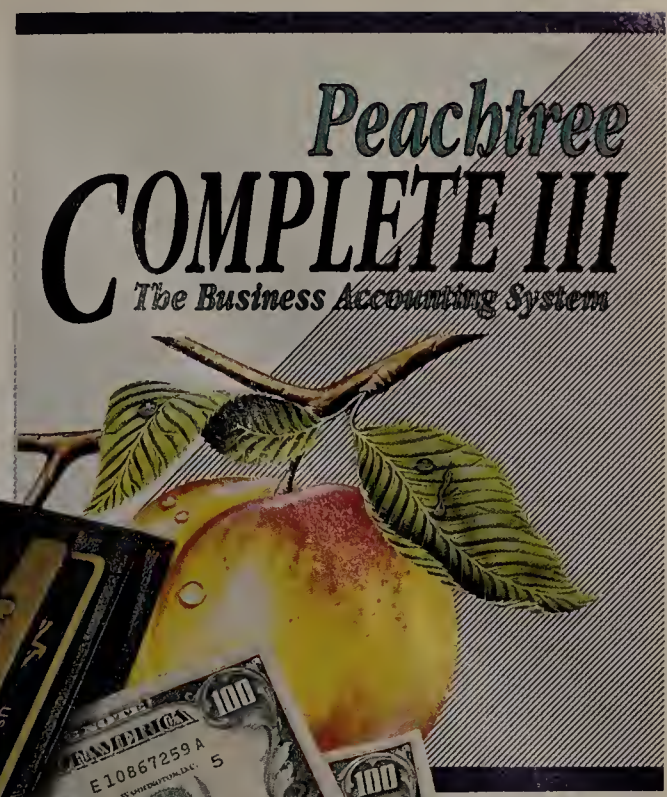

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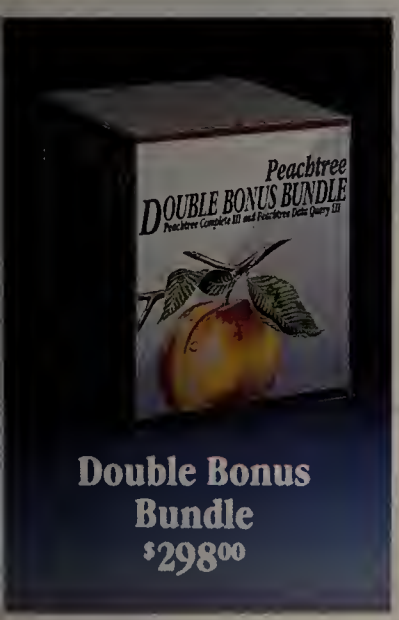

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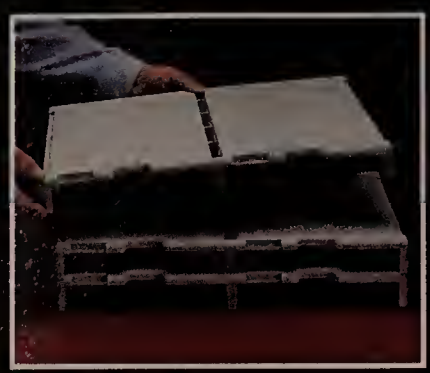

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LETTERS

Reactions and responses from the PC World community

BUD PEEN

SX Miscalculation

Your February 1990 *Industry Outlook* item "386SX Appeal Grows" [which refers to performance figures from December 1989's 16-MHz 386SX and 12-MHz 286 roundups] omits a key fact about the 80287 and 80387 numeric coprocessors. The 386s may have run "five DOS benchmarks only 28 percent faster" on average. But for serious number crunching, including spreadsheets, there's no comparison. With everything running at the same clock speed, the system with an SX chip and an 80387 coprocessor will perform two to three times faster than a 286 computer with an 80287 coprocessor.

Darrel L. Bartelheimer
Dayton, Ohio

ANTHONY RUSSO

Bad Tracking

Jerry Norris's story in February's *Consumer Watch* caught my eye. Vendors say they work hard to police their dealers and keep them from selling machines to unauthorized resellers. But the computer manufacturer that can't track the serial number of one of its computers to the original authorized dealer isn't effectively using the products it sells!

R. N. Maddox
Stillwater, Oklahoma

Consumer Watch Kudos

I was impressed by the depth of your response to my letter regarding the warranty problem on my Compaq 386. I think everyone who reads this column comes away better informed about dealer authorization requirements. I now know that some manufacturers don't provide warranties for their machines unless they're bought from authorized dealers.

Jerry Norris
Dallas, Texas

Parts Smarts

Your article on gray-market computers [*Consumer Watch,* February 1990] left me with an unanswered question: How can I be certain that even some ABCD [Microcomputer Industry Association] members don't switch internal parts on the name-brand computers they sell?

Kelly Gilbert
Columbia, Maryland

Query vendors and check their reputations. When you receive a product, take a few minutes to remove the cover and verify that you have what you paid for—even honest sellers make mistakes. Perhaps your strongest protection is to make your purchase with a credit card so that you can dispute the charges if necessary. —Roberta Furger

Can You Help This Reader?

I am a Romanian software designer, and I am particularly interested in PC-compatible programming. Our recent revolution has allowed us access to the outside for the first time in many years. Can you help by sending some information about programming and the PC?

Radu Ionut
str. A. Vlaicu, nr. 11
2700, Deva
Romania

K and Strikeout

In your recent preview of Lotus's *1-2-3/G* [February 1990], you said that *K* is a hard letter to remember for the Strikeout option. As any baseball fan could tell you, the box score notation for strikeout is *K*—as in Dwight "Dr. K" Gooden.

Vic Vitek
Fishkill, New York

Cache Question

I was puzzled by one comment about *PC Tools Deluxe* in your February 1990 review of disk caching software: "Several advanced tuning parameters...are not explained in the manual." When I contacted the technical service department at Central Point Software, they said they'd like to know what you're talking about. Can you explain?

William R. Smith
Plano, Texas

As we mentioned in the review, PC Tools Deluxe 5.5's *PC-Cache is a ver-*

(continues)

D. CUNNINGHAME-BLANK

Your memory isn't what it used to be.

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sion of Best Buy Super PC-Kwik *from Multisoft.* Super PC-Kwik's *manual does a fuller job of explaining how to set the advanced parameters that allow for best performance. Our remarks don't apply, however, to the current release,* PC Tools Deluxe 6.0 *(see this month's* Product Outlook*), which contains a new cache program written by Central Point Software. —Ed.*

A PS to Share

I'd like to point out an omission in your March 1990 Buyers' Guide, "Printer Sharing Made Simple." It's not clear from the narrative that printers from vendors other than Hewlett-Packard, Canon, and Brother can be shared by multiple PC users. In fact, PostScript laser printers from a wide variety of manufacturers can be shared with many of the products listed in your Buyers' Guide.

Derek Blazensky
Product Marketing Manager
Adobe Systems, Inc.
Mountain View, California

Our Buyers' Guide mentioned specific printers only when discussing the add-in boards on page 200. The external devices mentioned on pages 201–203, unlike the add-in boards, are not product specific and may work with PostScript printers. However, verify that a vendor's device lets users share a PostScript printer before buying; some have PostScript-specific models. —Ed.

Corrections and Clarifications

Richard Landry's March 1990 column ("PC Visions: Top Down or Bottom Up?") should have stated that the $62,000 price tag for Lotus Development's new *Notes* software includes licenses for 200 nodes, not 100.

In a March 1990 *Product Outlook* item, we reported that Instaplan Corporation's *Instaplan 5000* handles about 2000 tasks for each megabyte of EMS 3.2 or 4.0 memory (up to 2.5MB). Actu-

(continues)

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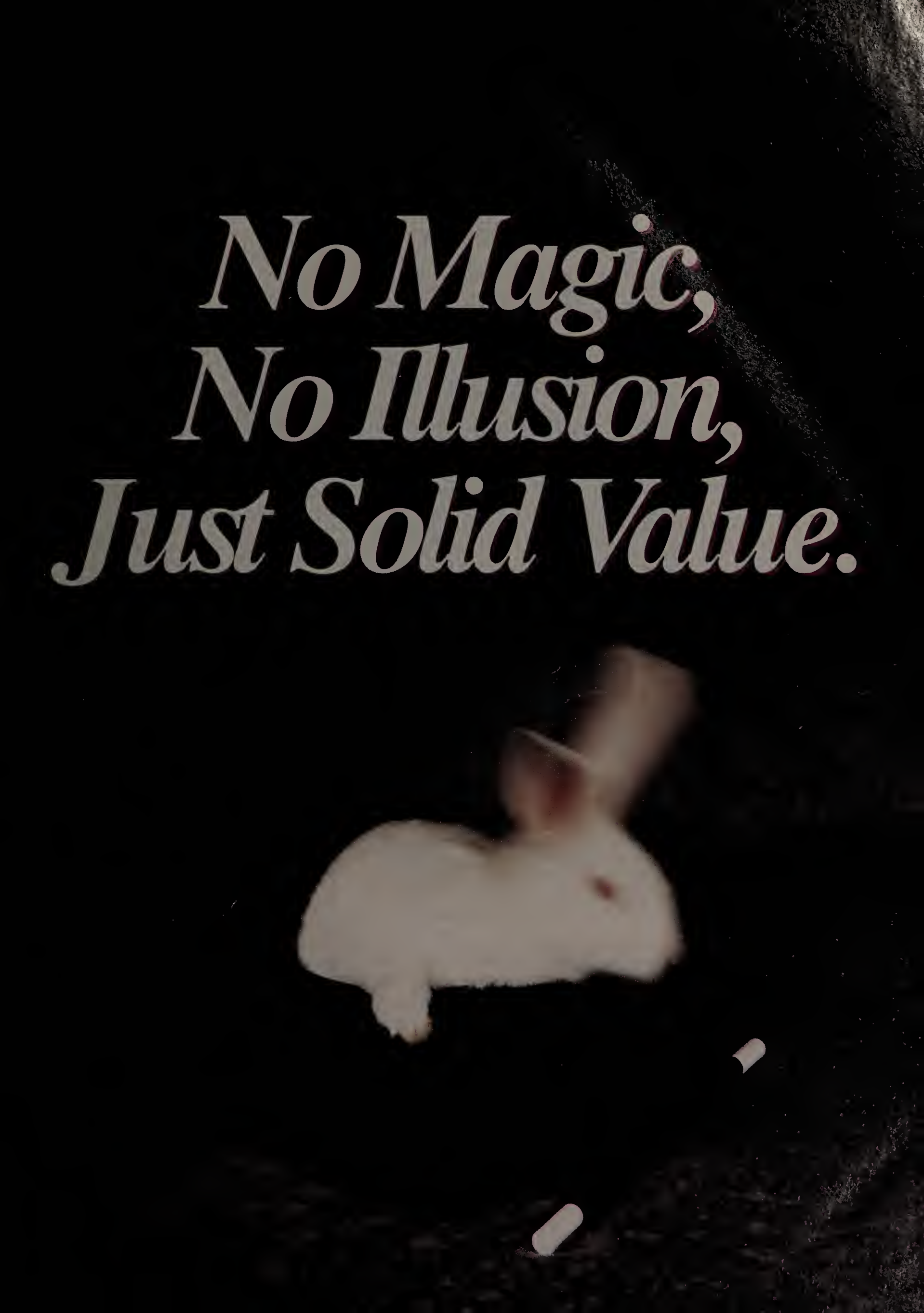

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Circle 43 on reader service card

ally, *Instaplan 5000* is capable of handling up to 16,000 tasks, 2000 tasks for each megabyte of EMS 3.2 or 4.0 memory (up to 8MB).

Since we completed our March 1990 review "A Laser on Every Desk," Facit has reduced the price of the Facit P6060 from $1995 to $1595.

Our March 1990 Buyers' Guide, "Printer Sharing Made Simple," should have given the data transfer rate for Wespercorp's FocalPoint Plus as 300–38,400 bps rather than 2000–2500.

To send correspondence, please see How to Contact PC World, page 4.

POWER TIP NO. 103

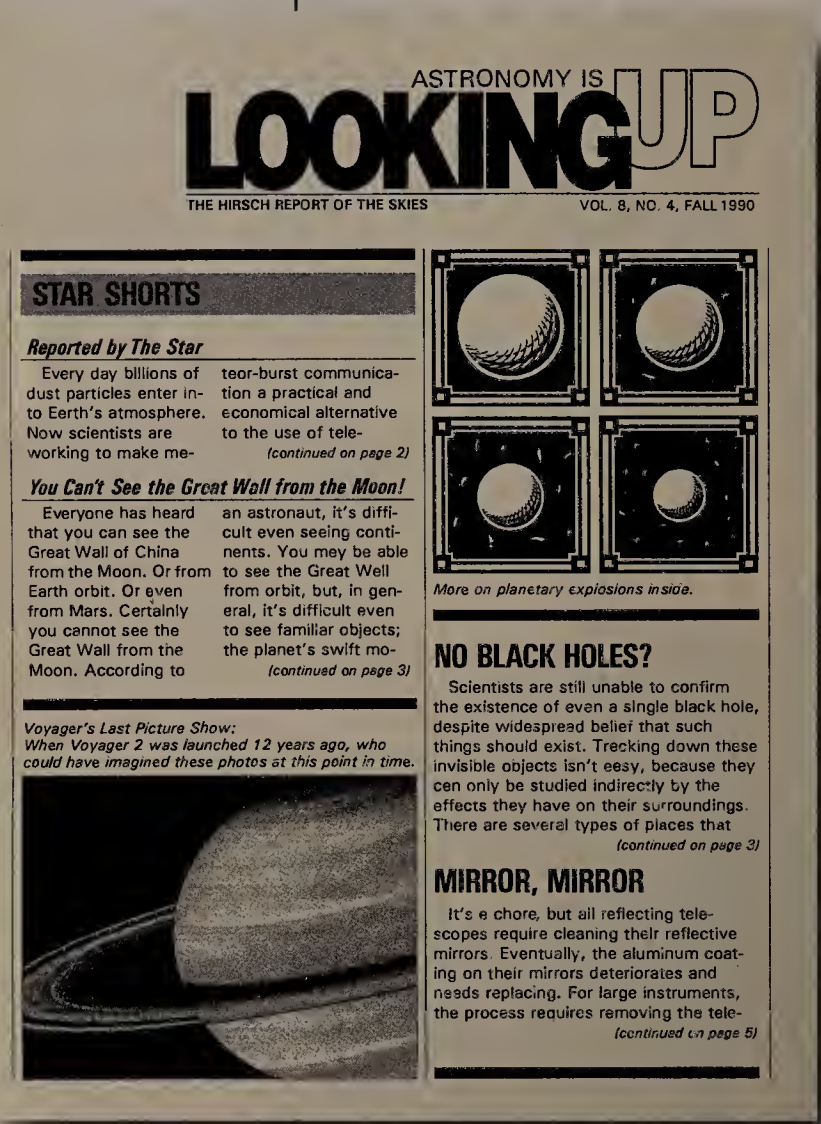
Quick Paradox Structure Copy

Here's a quick way to copy the structure and objects associated with a *Paradox 3.0* table without duplicating the actual data. From the *Paradox* main menu, select *Create*, type in a name for your new table, and press **<Enter>**. Press **<F10>** to go to the Create menu, and select *Borrow*. Type in the name of your source table and press **<Enter>**. Press **<F10>** again, and select *DO-IT!*. Press **<F10>** and select *Tools Copy Justfamily*. Type in the name of the source table, press **<Enter>**, type in the name of the new table, and press **<Enter>** again. Select *Replace*, and your new table will be an empty twin of the original.

Percy Tierney
Technical Support Representative
800-SOFTWARE
Berkeley, California

Other laser printers play with one standard dot size.

HP makes it a



ASTRONOMY IS LOOKING UP

THE HIRSCH REPORT OF THE SKIES VOL. 8, NO. 4, FALL 1990

STAR SHORTS

Reported by The Star

Every day billions of dust particles enter into Earth's atmosphere. Now scientists are working to make meteor-burst communication a practical and economical alternative to the use of tele- *(continued on page 2)*

You Can't See the Great Wall from the Moon!

Everyone has heard that you can see the Great Wall of China from the Moon. Or from Earth orbit. Or even from Mars. Certainly you cannot see the Great Wall from the Moon. According to an astronaut, it's difficult even seeing continents. You may be able to see the Great Wall from orbit, but, in general, it's difficult even to see familiar objects; the planet's swift mo- *(continued on page 3)*

Voyager's Last Picture Show: When Voyager 2 was launched 12 years ago, who could have imagined these photos at this point in time.

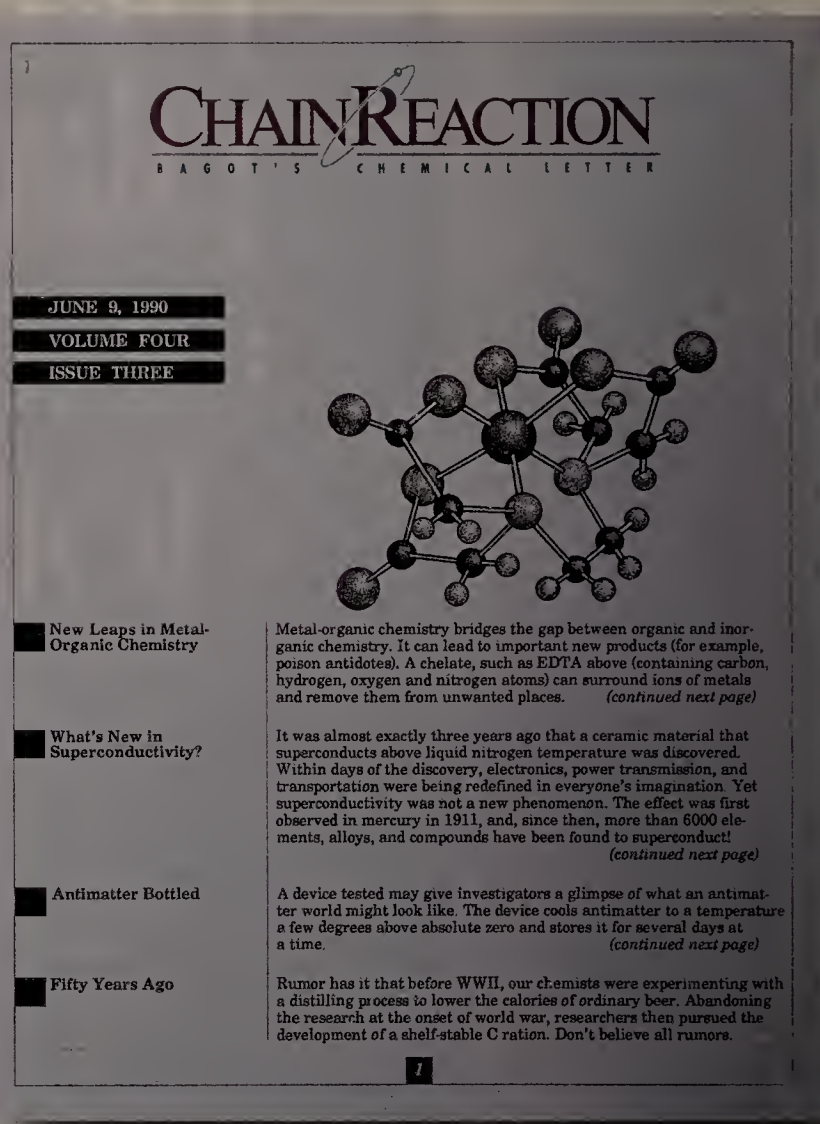
More on planetary explosions inside.

NO BLACK HOLES?

Scientists are still unable to confirm the existence of even a single black hole, despite widespread belief that such things should exist. Tracking down these invisible objects isn't easy, because they can only be studied indirectly by the effects they have on their surroundings. There are several types of places that *(continued on page 3)*

MIRROR, MIRROR

It's a chore, but all reflecting telescopes require cleaning their reflective mirrors. Eventually, the aluminum coating on their mirrors deteriorates and needs replacing. For large instruments, the process requires removing the tele- *(continued on page 5)*



CHAIN REACTION

BAGOT'S CHEMICAL LETTER

JUNE 9, 1990
VOLUME FOUR
ISSUE THREE

New Leaps in Metal-Organic Chemistry — Metal-organic chemistry bridges the gap between organic and inorganic chemistry. It can lead to important new products (for example, poison antidotes). A chelate, such as EDTA above (containing carbon, hydrogen, oxygen and nitrogen atoms) can surround ions of metals and remove them from unwanted places. *(continued next page)*

What's New in Superconductivity? — It was almost exactly three years ago that a ceramic material that superconducts above liquid nitrogen temperature was discovered. Within days of the discovery, electronics, power transmission, and transportation were being redefined in everyone's imagination. Yet superconductivity was not a new phenomenon. The effect was first observed in mercury in 1911, and, since then, more than 6000 elements, alloys, and compounds have been found to superconduct! *(continued next page)*

Antimatter Bottled — A device tested may give investigators a glimpse of what an antimatter world might look like. The device cools antimatter to a temperature a few degrees above absolute zero and stores it for several days at a time. *(continued next page)*

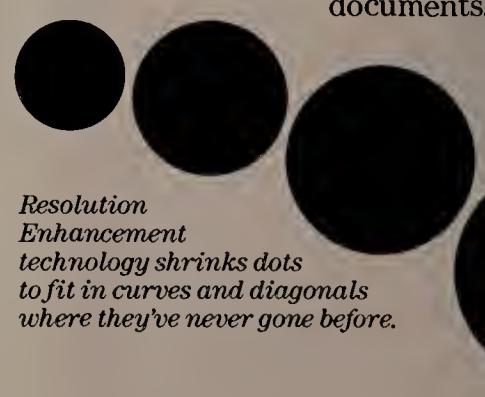
Fifty Years Ago — Rumor has it that before WWII, our chemists were experimenting with a distilling process to lower the calories of ordinary beer. Abandoning the research at the onset of world war, researchers then pursued the development of a shelf-stable C ration. Don't believe all rumors.

1

Introducing the new HP LaserJet III printer with Resolution Enhancement technology.

The rules have changed. Now the name of the game is Resolution Enhancement technology. You'll call it the best thing to happen to laser printing since the very first HP LaserJet printer. It gives you clearer resolution. Curves that really curve. And edges that are never jagged.

Instead of a "one-size-fits-all" dot, HP's built-in intelligence varies dot sizes. So they can fill areas where they could never go before. For clearer, more professional-looking documents.



Resolution Enhancement technology shrinks dots to fit in curves and diagonals where they've never gone before.

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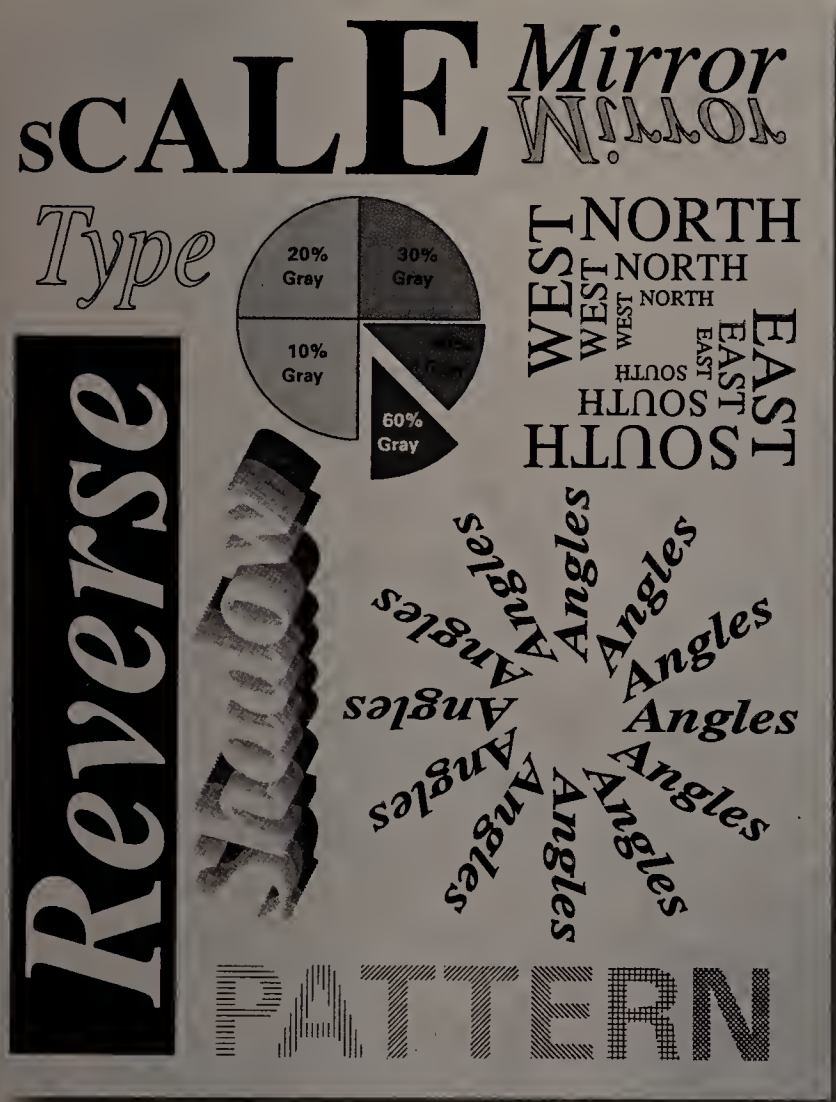
whole new ball game.



But there's more than better print quality. 14 bit-mapped fonts and 8 internal scalable typefaces provide thousands of options. And enhancements to our PCL5 printer language, including our HP-GL/2 graphics language, let you print portrait and landscape on the same page. Reverse and angled type. Spirals. Even shaded text. You can also plug in Adobe PostScript® software.

For all its new features, the $2,395* list price of the HP LaserJet III is a good deal less than the HP LaserJet

Series II printer it replaces. With the same hardware compatibility, wide range of applications, 8 ppm print speed, and software compatibility, including WordPerfect 5.1 and WordStar® 6.0. And the same reliability as the rest of the HP printer family.

So call **1-800-752-0900, Ext. 1007.** Ask for our booklet on Resolution Enhancement technology and where to find your nearest authorized HP dealer. We'll put you in a whole new league.

There is a better way.

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THE HELP SCREEN

PC World offers answers and advice at every level

Pick the proper graphics upgrade, keep your disk labels neat, determine how much data a 30MB drive can hold, reload COMMAND-.COM from the network, temper your expectations of OS/2's DOS compatibility box, and learn about backing up a NetWare 386 server.

Karl Koessel

EGA or VGA? That Is the Question

Q. *It's high time I upgraded my AT's video adapter. It's a CGA board, which produces hard-to-read text, coarse graphics, and very few colors. Because my AT was one of the first produced, I'm wondering whether its CGA board can be replaced with an EGA or VGA board. If so, do I need a new monitor as well? Or is it true that I can use my existing monitor with an EGA board, even if doing so doesn't yield improved clarity?*

Edwin X. Saltz
Massapequa, New York

A. You can replace your CGA board with either an EGA or a VGA board. And yes, an EGA board can drive your existing monitor, but only if you set its switches so that it emulates a CGA board. However, spending money to get the same color/graphics capability your system already has makes no sense; you might as well wait until you can buy a new video adapter and an appropriate monitor at the same time.

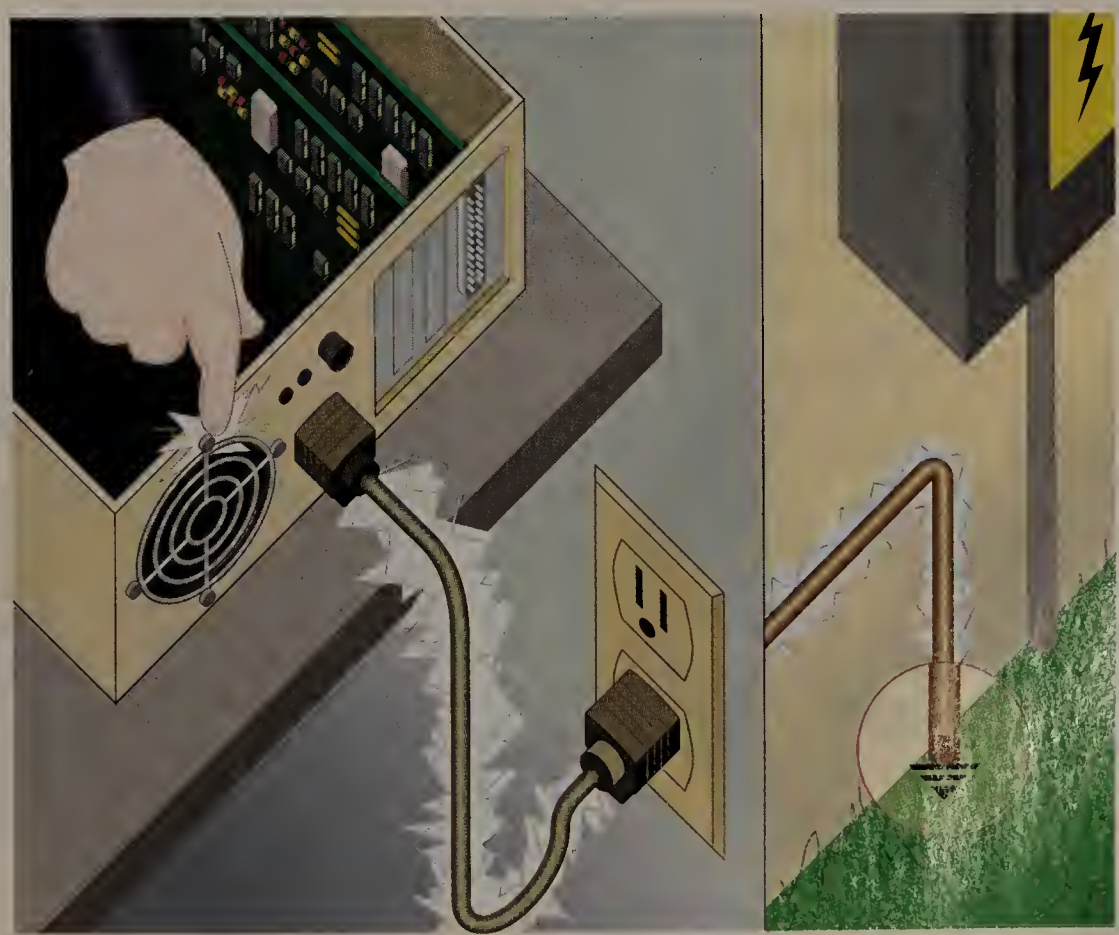
You'll spend less and get more if you skip EGA and upgrade directly to VGA. The reason? A VGA board and its corresponding analog monitor are cheaper than the less-capable EGA board and digital monitor combination. These days, a complete VGA setup can cost as little as $500. If you use CAD, desktop publishing, *Windows*, or Presentation Manager software, you might also consider a multiscan monitor and a super-VGA board; together they can display more colors in standard VGA resolutions; you also get extra-sharp resolutions of 800 by 600 or even 1024 by 768. For details, check out "Look Sharp With a Super-VGA Board" and "Smart Monitors, Smart Buys," both in last month's *PC World*.

The Well-Groomed Disk

Q. *I frequently need to replace floppy disk labels. Can you recommend a brand of label that will peel off neatly*

(continues)

Protect Your PC—Ground Yourself!

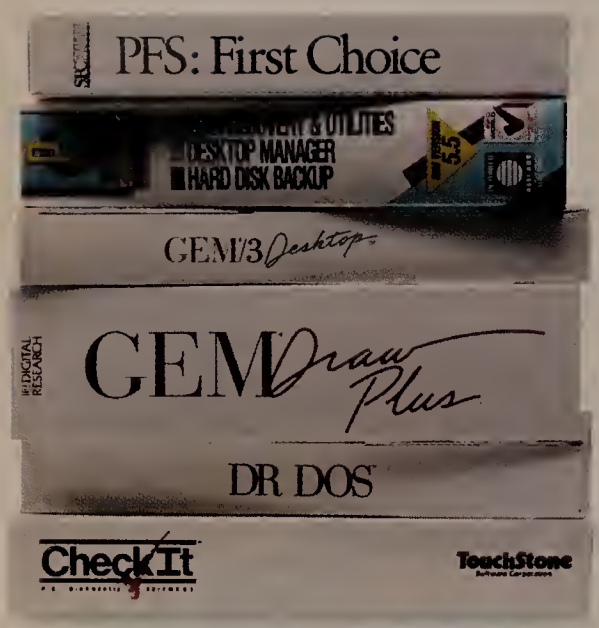


MATTHEW NIELSEN

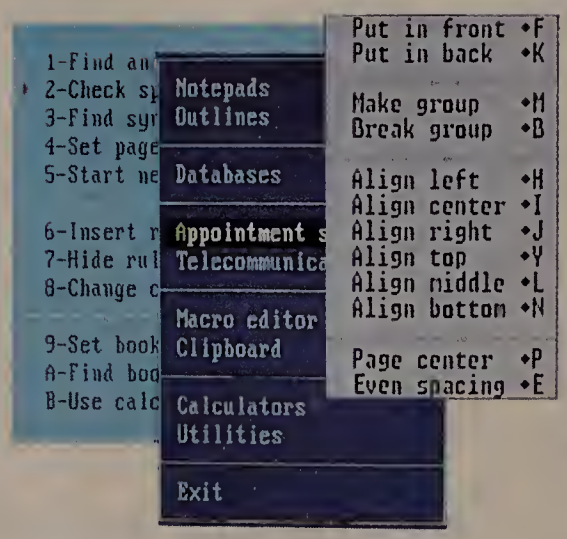
Before working inside your PC, use the power cord to connect the PC to a grounded outlet, and then touch the fan's grill, located on the back of the system unit, to discharge harmful static.

ANTHONY RUSSO

How on earth a reputation



Loads of software, pre-loaded on hard-disk



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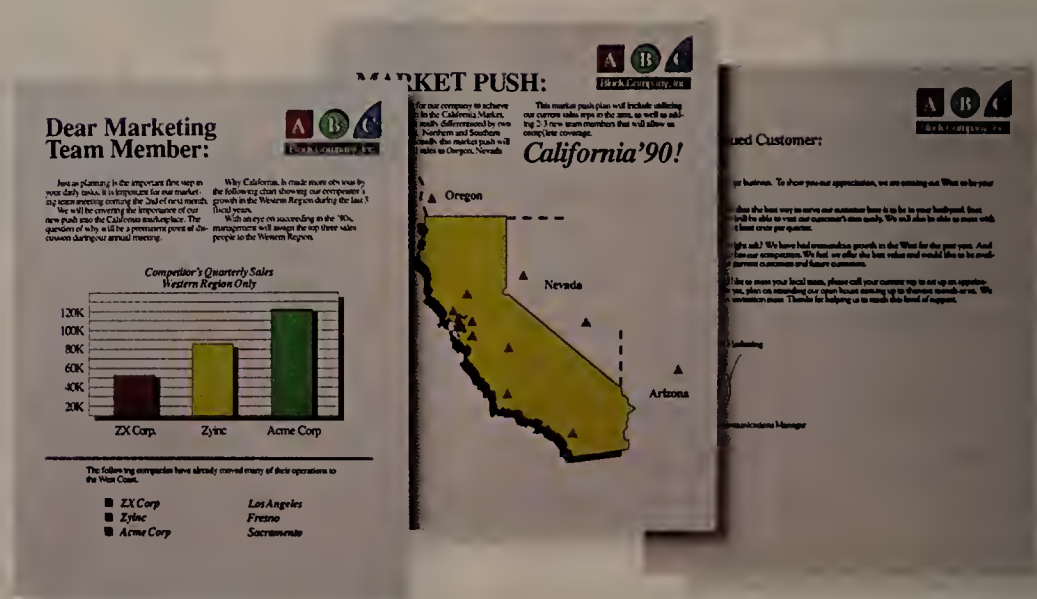

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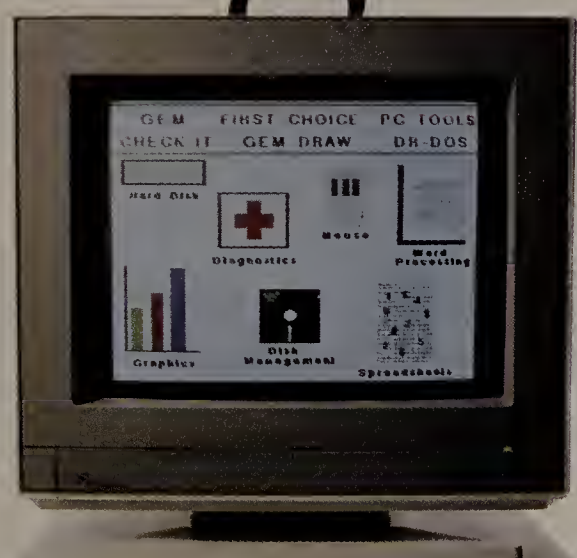
are we getting for being easy?



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in one piece and not leave adhesive residue? Or is there a cleaner that will do the job without harming the disk or its jacket?

Ken Glaser
Corona, California

A. You won't need a solvent to clean excess adhesive if you use a removable label. Office workers use removable labels for a variety of purposes, from tagging items with colored dots to labeling file folders. The labels come in assorted shapes, colors, and sizes, and they don't cost much more than permanent ones. For example, 1-by-3-inch white labels cost less than 2 cents apiece, and you can find them in any stationery or office products store. If your office has a supplier, ask him or her for samples.

You might also consider an excellent alternative offered by *PC World* reader Brian E. Smith of Piedmont, South Carolina: Put a white, nonremovable label on the disk, place a piece of clear removable household tape on the label, and write on the tape. Then, whenever you need to "erase" the label, you can simply replace the removable tape with a new piece.

Mathematical Misgivings

Q. *What's the storage capacity of my 30MB hard disk? Sometimes the prefix* kilo (K) *is used to mean 1000 and* mega (M) *to mean 1,000,000; but I've also been taught that a kilobyte is equal to 1024 (2^{10}) bytes, and that a megabyte is 1,048,576 (2^{20}) bytes. However, I'm not sure which numbering system applies to the capacity of a hard disk. Does a 30MB hard disk hold 30,000,000 bytes or 31,457,280 (30 times 1,048,576) bytes?*

Yeoung D. Kang
Lincoln, Nebraska

A. Most of the computer industry uses *K* and *M* to mean 2^{10} and 2^{20}, although advertisements occasionally misuse these symbols to bloat figures. However,

(continues)

NETWORK Q&A

Backing Up a NetWare 386 Server

Peter Tait

Q. *I'm thinking of upgrading my company's Novell network to the latest version, NetWare 386. However, I'm concerned that changes in the new release might make my tape backup system inoperative. Is this true? If so, how can I back up a NetWare 386 server?*

John Armstrong
Baltimore, Maryland

A. Yes, because the "bindery information" (which maintains extended attributes and extra security information) for NetWare 386 has a new format, your current backup system will not be able to back up a Novell NetWare 386 server's bindery files. Your backup system will be able to back up DOS files, but without the security and attribute information intact. Until your tape backup vendor comes out with a software upgrade for NetWare 386, you can back up the bindery data to a floppy disk by running the NetWare 386 NBACKUP utility.

In addition to the new file attributes, Novell has provided a "multiple name space" feature, which allows clients running different operating systems to store files on the server in their native operating system form. Thus users on Apple, Sun, and IBM-compatible computers might each see the same file in a different way; all of them would be able to access it as if it were created on their own machine.

Virtually all the leading tape vendors have announced or are developing versions of their products that will support these new NetWare features, but Novell now supplies an alternative backup method.

Although other manufacturers are doing the same—WangTec, Gigatrend, ADIC, and Transitional Technologies have received Novell certification, and 18 other companies have applied for it—it is not clear that all major tape vendors are going to support this interface. NBACKUP and UPGRADE will back up and restore a server using any tape drive that supports Novell's new Device Independent Backup Interface, or DIBI. ADIC, of Redmond, Washington, was the first company to provide a DIBI driver for its tape drives. It is safe to assume, however, that every major tape vendor will employ or is already using one or the other of these strategies.

Don't hold back upgrading to this very powerful network operating system.

Peter Tait is the network engineering manager at The Lambda Group, a San Francisco–based consulting firm and developer of distributed applications.

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What the ex driving

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perts will be this year.

And, with the resolution coming in at a mind-reading 400 points per inch, cornering, stopping and starting are second nature.

What it means is you can race through even the most complicated software programs without hesitation.

Combine all of this with the fact there's OS/2 support in the driver, and your Mouse is ready for today's sophisticated applications.

You're even in control of what type of software you can add. We give you a choice of either Microsoft Windows™ or Microsoft Paintbrush™.

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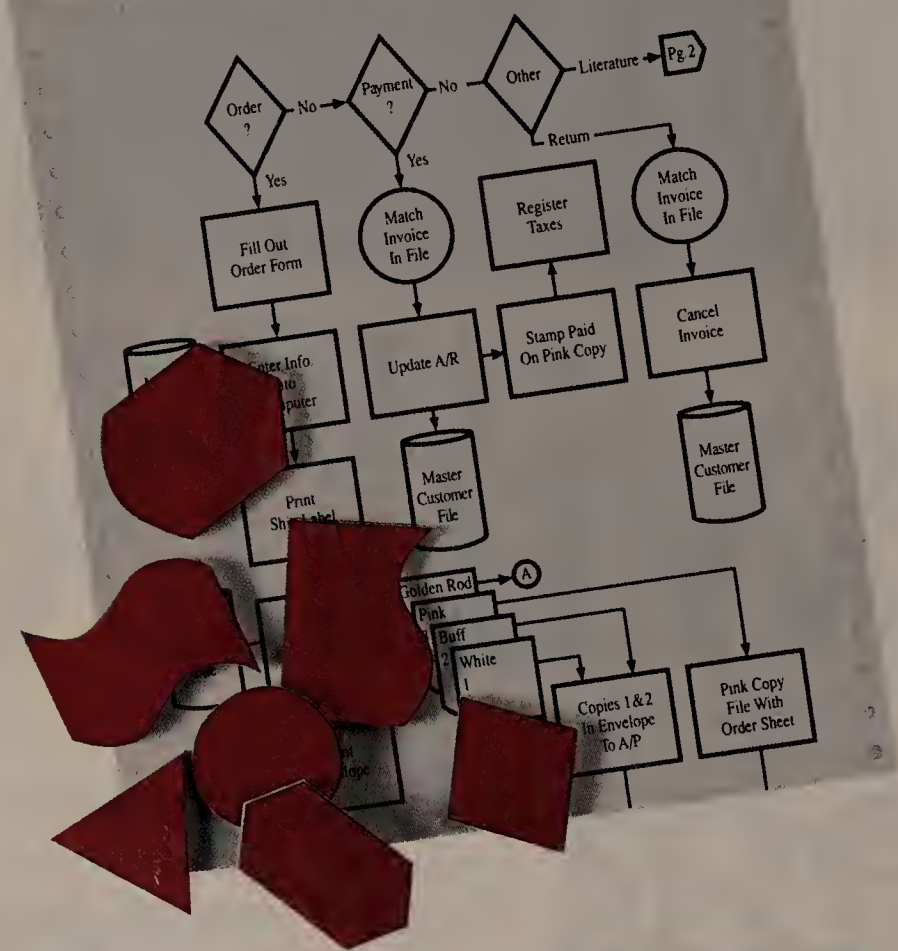
because hard disk capacities are so large, they're usually rounded off. For example, when I issue the DOS command CHKDSK, I'm told that total disk space is 61,607,936 bytes, which means my 60MB drive actually holds only 58.75MB. But there's more to understanding storage capacity than simple multiplication.

Although you can determine the bytes of storage space theoretically available, you'll never actually use all of them. As an analogy, consider a notepad. The maximum number of characters it can hold is the number of characters you can fit on one page times the number of pages. However, a note (or its last page, if it has more than one) usually doesn't fill the page. The remaining space will never be used because you'll begin the next note on a new page.

Similarly, hard disk storage space is divided into numerous *clusters*. Most clusters are 2K in size, although some older drives use 4K or even 8K clusters. DOS allocates space to a file (or subdirectory) only in whole clusters, so even a 1-byte file takes up an entire cluster. Likewise, a 2049-byte file occupies two 2K clusters. As a result, some of a disk's storage space is always empty.

BUILD TO SUIT.



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Floppy-Based Workstations

Q. *At work I use a networked PC without a hard drive. Once a month, I write a report; I load* Microsoft Word *from the network and save my file to a data disk in drive A:. But when I quit* Word, *I'm not back at the DOS prompt; instead there's a message telling me to reinsert the boot disk, and I have to wait and wait and wait. Why does this happen, and what can I do to avoid it?*

Constantine Heger
Brussels, Belgium

A. When you boot your PC, it loads DOS into memory. DOS then loads COMMAND.COM, which manages essential tasks like displaying the DOS prompt, interpreting the commands you enter, executing internal DOS commands (such as DIR, COPY, and PATH), and loading and executing programs such as *Word*. Finally, DOS notes where COMMAND.COM was loaded from by writing into an area of memory that's called the DOS environment the line COMSPEC=A:\COMMAND.COM.

Much of COMMAND.COM's code isn't needed while an application is running. DOS therefore allows an application to use the memory holding the unneeded code. If that code has been overwritten, DOS reloads COM-

(continues)

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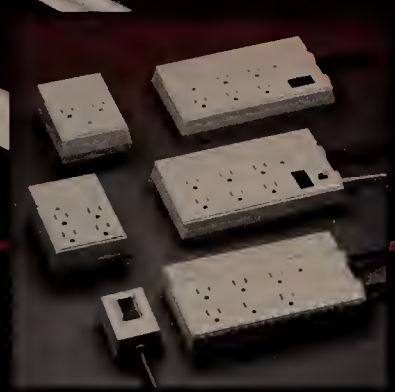

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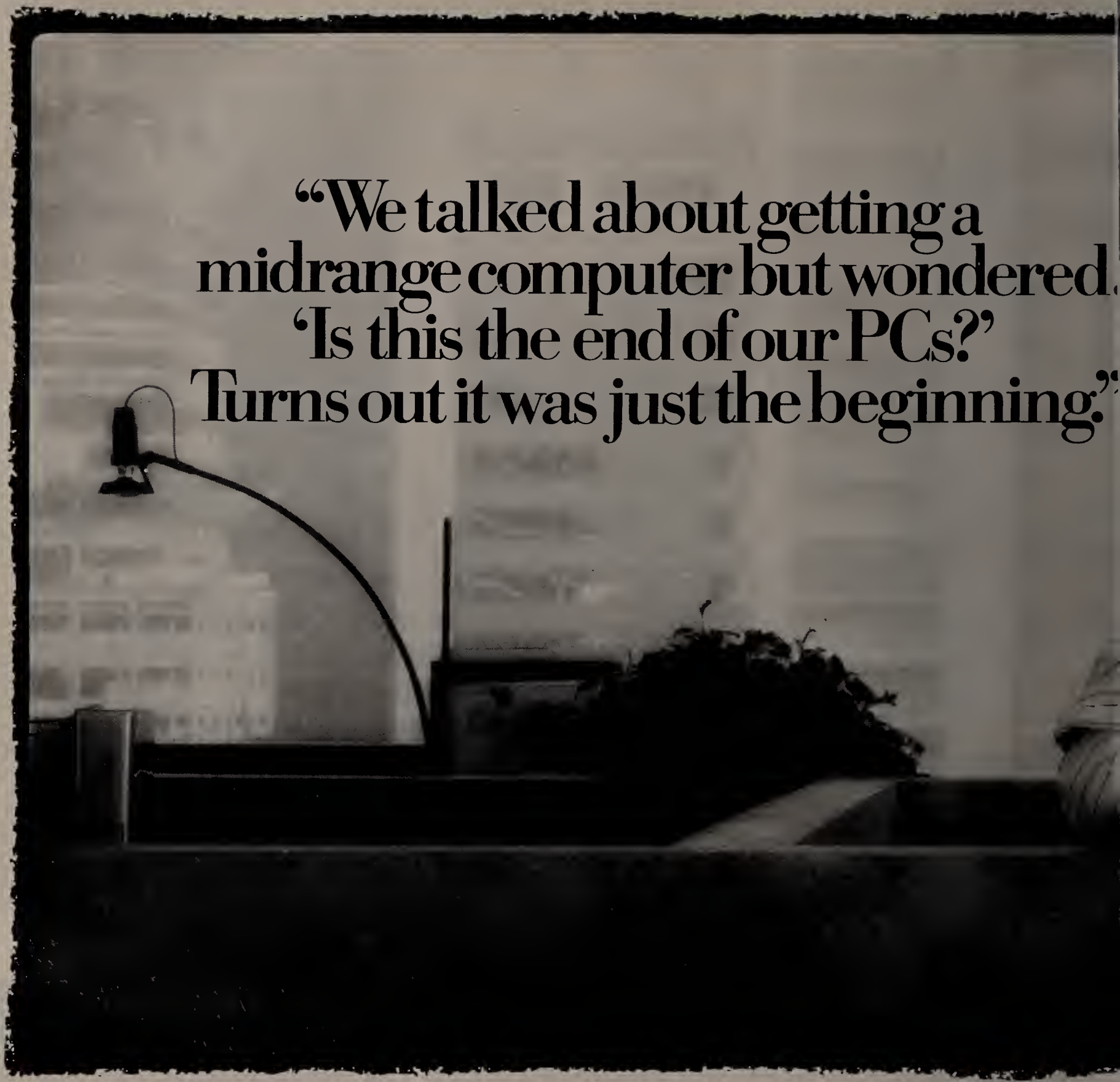

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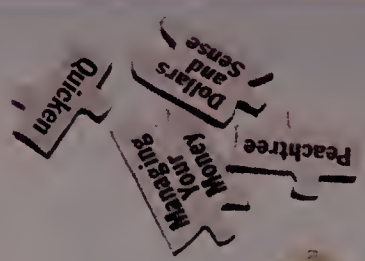

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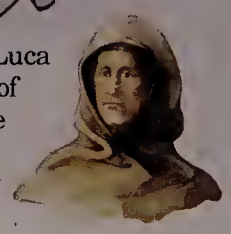

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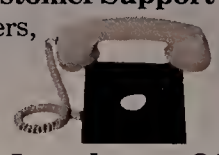

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MAND.COM when you quit the application. To do so, it must find COMMAND.COM, and so it looks in the environment for the location of that file. That's why DOS asks you to put your boot disk back in drive A:. (Hard disk users rarely if ever see that message since their boot disk—the hard drive—is almost always available.)

If you can reset COMSPEC's value so that DOS looks for COMMAND.COM on the network's hard drive, you'll never have to reinsert your boot disk just to get a DOS prompt. Ask your network administrator which network drive and directory the DOS file COMMAND.COM is stored in (on my network, it's in X:\PUBLIC\DOS). Then, put your boot disk in drive A:, start *Word*, press **<Esc>**, type **tla:\autoexec.bat** to load AUTOEXEC.BAT from your boot disk, and press **<Enter>**. At the beginning of the file, type the line **set comspec=x:\public\dos\command.com** (substituting the appropriate drive and directory path for your network) and press **<Enter>**. Save the file, quit *Word*, and reboot the system with **<Ctrl>-<Alt>-<Delete>**, but don't log on to the network.

At the DOS prompt, type **set** and press **<Enter>** to inspect your system's environment. If COMSPEC is not set to the appropriate network drive and directory, start over or get some help from your network administrator. If COMSPEC is set correctly, reboot the system and log on to the network. Inspect the environment again. If COMSPEC's setting has changed, the network may be resetting its value; get help from your network administrator.

OS/2's DOS Compatibility Box

Q. *OS/2 includes a special session—commonly called the DOS compatibility box—that provides a command prompt for running DOS programs. However, I have heard that OS/2's DOS box doesn't support all DOS software.*

(continues)

PC MAGAZINE
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July 1989
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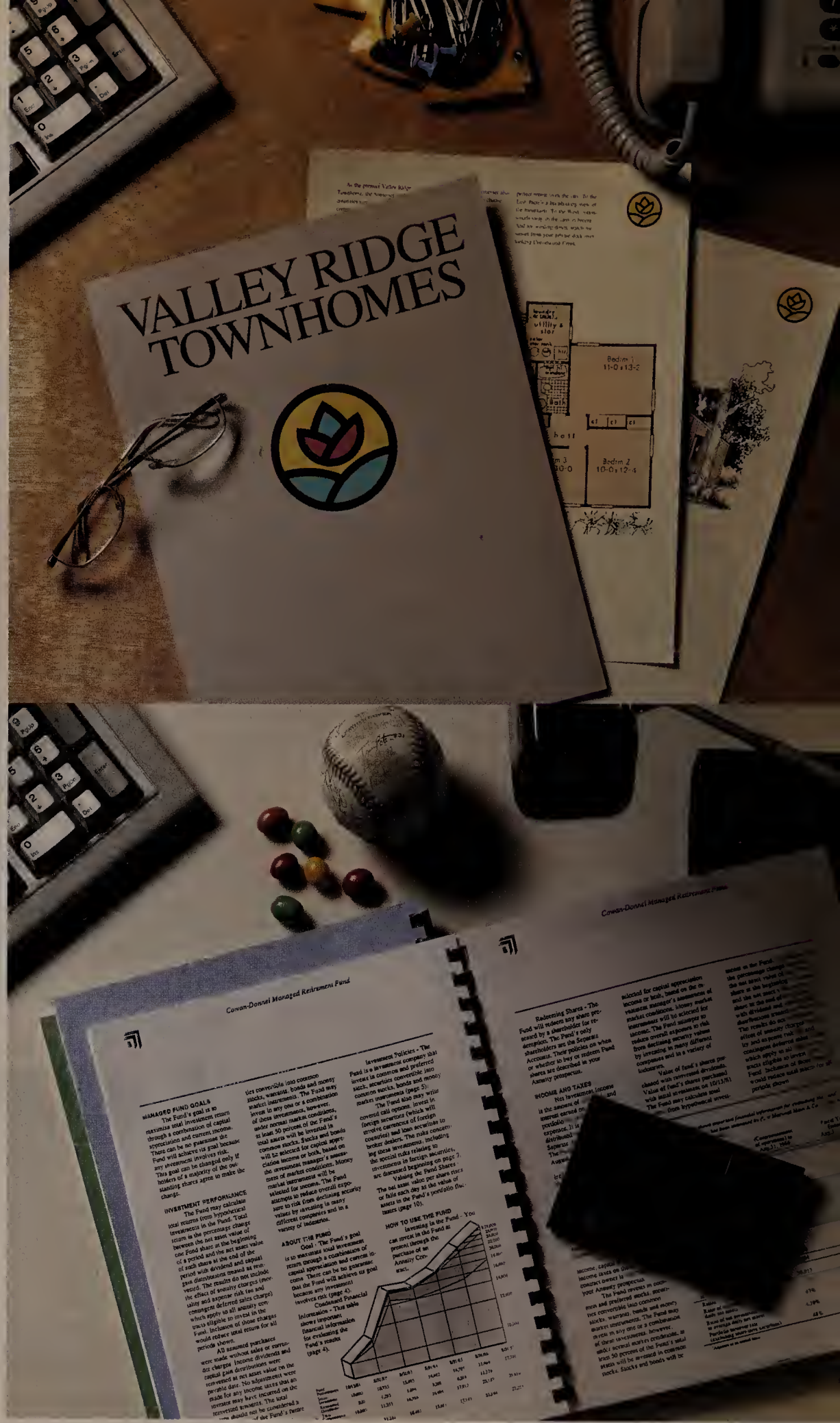

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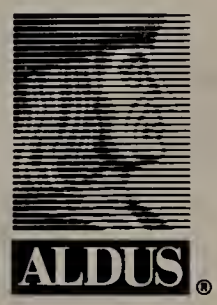

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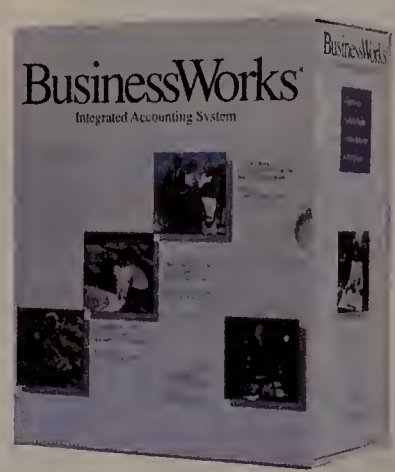

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SOFTWARE SYSTEMS

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What programs can and can't run in the box? And why?
Susan Robinson
Salt Lake City, Utah

A. DOS's "640K barrier" is one of the problems OS/2 was designed to solve. Consequently, programs constrained by DOS's limited memory are among the first OS/2 applications that vendors have offered. If your favorite application is available in an OS/2 version, great; otherwise, you'll have to use the DOS compatibility box or boot DOS instead of OS/2. You get about 495K of user memory in the DOS compatibility box of IBM OS/2 1.2. That's 75K and 90K less RAM, respectively, than DOS 4.1 and DOS 3.3 provide; as a result, the DOS

(continues)

POWER TIP NO. 104

Label-Printing Batch File

You can print a quantity of 1-across labels, all containing the same information, directly from DOS without the use of a word processor or a label-printing program. Enter your label's text into an ASCII text file called **LABEL.TXT.** Assuming 1-inch labels and standard type, this file must total six lines; add blank lines at the top or bottom as needed. Create a batch file called **LABEL-.BAT** with the following commands:

```
:doit
type label.txt > prn
goto doit
```

When you run LABEL.BAT, it will continuously print your labels until you stop it with **<Ctrl>-C**.

Robert Carlson
800-SOFTWARE
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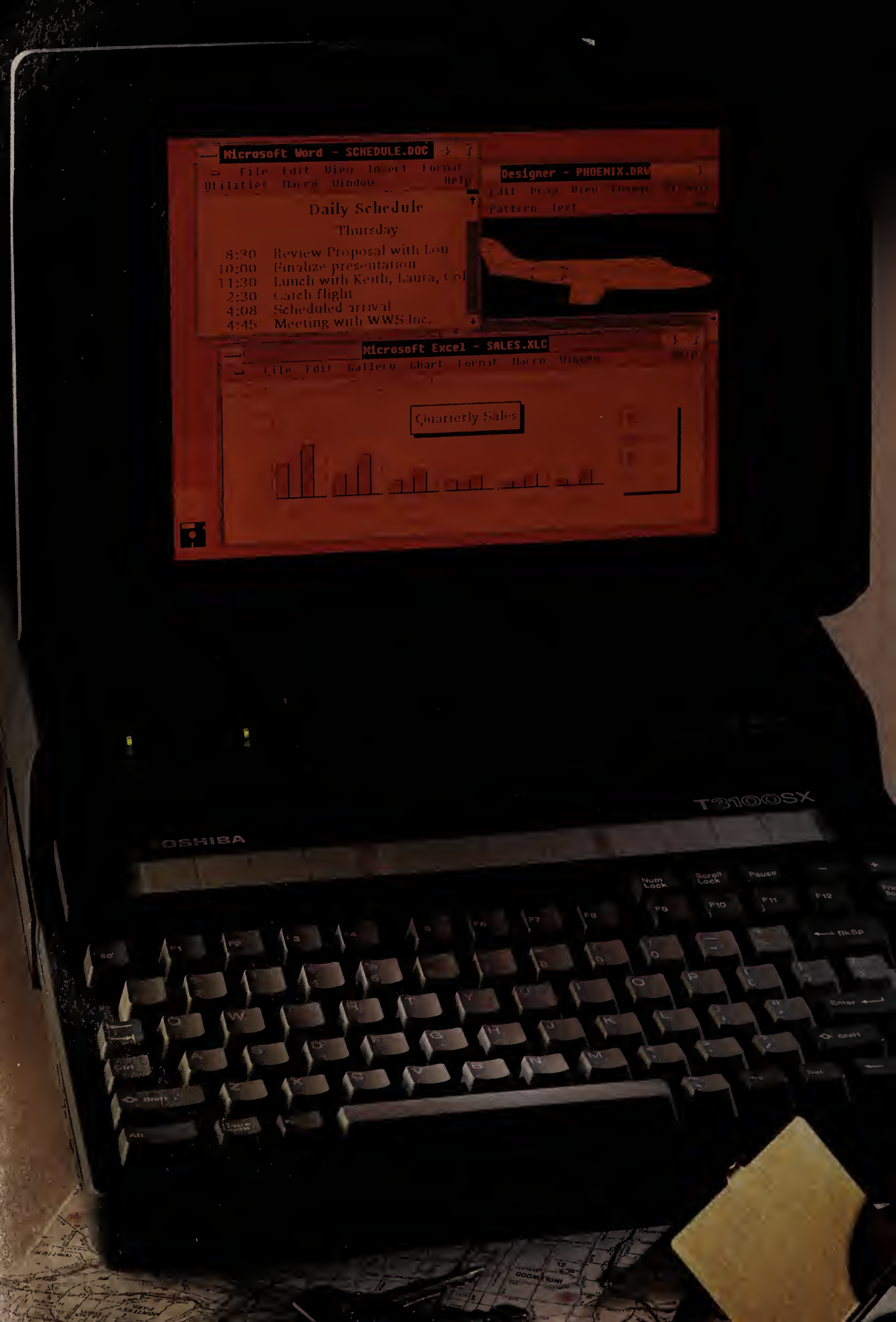
Microsoft Word - SCHEDULE.DOC
File Edit View Insert Format
Utilities Macro Window Help
Daily Schedule
Thursday
8:30 Review Proposal with Lou
10:00 Finalize presentation
11:30 Lunch with Keith, Laura, Col
2:30 Catch flight
4:08 Scheduled arrival
4:45 Meeting with WWS Inc.
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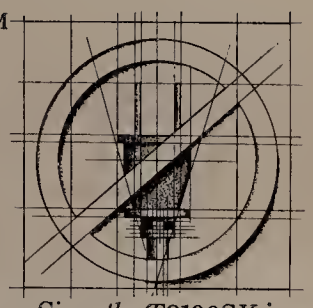

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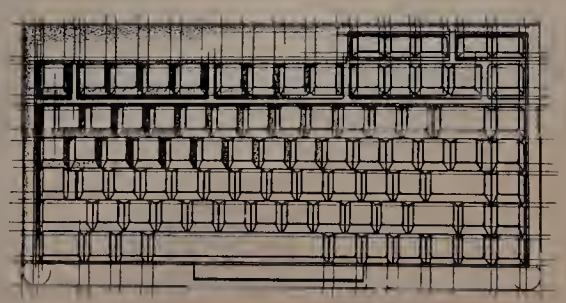

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box can't run certain large programs, such as *Ventura Publisher.* And other programs that don't work with partial data files (like the DOS versions of *1-2-3*) may not be able to load your larger data files. Nor will you be able to run any applications that depend on expanded or extended memory.

Although OS/2 multitasks its programs, processing in the DOS box stops when the box is not in the foreground. Even then, a DOS application stops and starts several times a minute as OS/2 services its other processes. As a result, time-dependent applications, such as synchronous mainframe communications links, real-time data acquisition, and process control, are not supported by the DOS box.

Hardware-dependent applications, such as networks or those that use specialized printers or video systems, will not function with DOS drivers. If an OS/2 driver is available for a piece of hardware, applications in the DOS box should be able to use it. Unfortunately, OS/2 drivers have been slow to appear.

Most 386-specific programs, such as *Paradox 386,* are not compatible with the current OS/2, and it's doubtful they'll be compatible with the upcoming 386 version, OS/2 2.0. I expect software companies will rewrite such programs for that version.

You get about 495K of user memory in IBM OS/2 1.2's DOS compatibility box—that's 90K less than DOS 3.3 provides.

DOS multitasking environments—*Desqview* and *Windows,* for example—either will not run or are severely limited in the OS/2 DOS box. The DOS box is meant for a single DOS application. Using a DOS multitasking environment within 640K doesn't make sense, especially since OS/2 itself is a multitasking environment.

The 386 version of OS/2 will provide multiple DOS boxes. But if you're used to working within a particular DOS environment, you'll probably want to be able to boot either DOS or OS/2 as you choose, at least until most of your applications are available for OS/2.

With IBM OS/2 1.2, it's possible to set up your system so that you can reboot into either DOS or OS/2. Next month I'll show you how to install the "dual boot" feature, which makes switching between OS/2 and DOS as simple as clicking on an icon.

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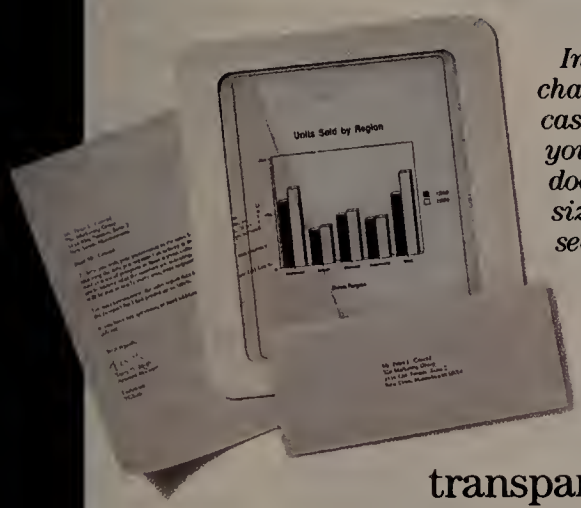

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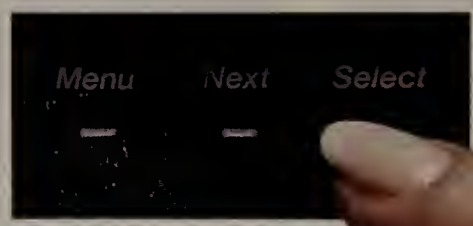

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Now you can change programs on your computer just as easily.

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"Click," word processor.
"Click," database.

Imagine. Now you can change from one software program to another just like changing channels on your television. With Software Carousel,® it's that easy.

No more saving files, exiting programs, loading new programs and retrieving new files, every time you need to change applications.

Simply load your programs in the morning (it handles up to twelve at a time). Then "click" from one to another all day long.

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Or load several sessions of the same program, each with a different file, pop back and forth, and work on several spreadsheets, documents, or anything else, all at once.

Why didn't someone do this before?

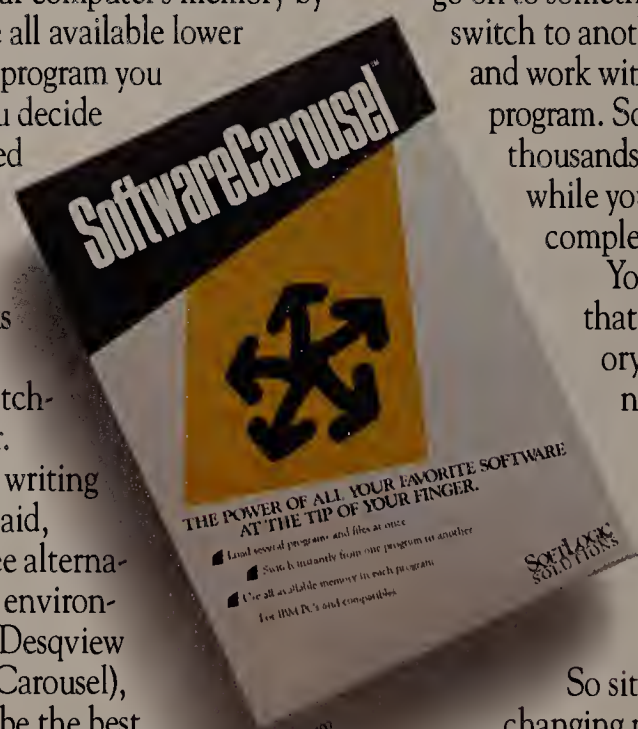
Actually, a lot of people tried. But what they ended with were a bunch of fancy software "environments" that eat up memory, change the way you work, and boggle the mind with complexity.

Plus, a lot of them make you buy new "compatible" software applications. Some even make you buy a bigger computer.

Software Carousel, on the other hand, works with the programs you already own. So you can go on using 1-2-3, WordPerfect, dBASE, SideKick, any program that runs on the computer you use right now. In an absolute minimum of memory. Without changing anything about the way your software runs.

Best of all, Software Carousel makes the most of your computer's memory by letting you use all available lower RAM in each program you use. And if you decide to add extended or expanded memory, Software Carousel works with that too, and makes switching even faster.

Garry Ray, writing for PC Week said, "Of these three alternative operating environments (OS/2, Desqview and Software Carousel), Carousel may be the best choice of the day."



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Circle 23 on reader service card

CONSUMER WATCH

Advice and information for the computer consumer

Readers sound off about warranties, return policies, and companies that excel at providing service and support.

Roberta Furger

Going the Extra Mile

As a struggling computer user without a lot of technical knowledge, I read *Consumer Watch* with great interest. Warning users of companies that do not live up to their claims is valuable. However, it is just as valuable to identify companies that go the extra mile for their customers. I have experienced such an effort, which I would like to share with your readers.

I recently upgraded from an XT clone running DOS 2.11 to a 386SX with DOS 4.0 from Positive Corporation of Chatsworth, California. I was unable to operate my word processing program, and a member of Positive's technical staff helped me troubleshoot the situation.

About two weeks after the purchase, the monitor began to fail. Another member of the technical support staff (who commutes to Phoenix) offered to deliver a temporary monitor to my home until a replacement could be shipped. He brought the monitor over at my convenience and then spent time answering additional questions about the system.

During the entire experience, the staff responded to my inquiries cheerfully and promptly. The customer service delivered by Positive Corporation has been outstanding.

J. W. Ranby
Phoenix, Arizona

More Commendations

I bought a Genius serial mouse from KYE International Corporation of Chino, California, in January 1988. I have since upgraded my word processor and numerous other programs and have found mouse incompatibilities on several occasions. I would like to commend the staff of KYE International for sending me driver upgrades, not only free of charge but very willingly, each time this happened. All it took was a phone call.

I read a lot of complaints from consumers about the shoddy follow-up service they get after they've paid for a product. It is comforting to see a corporation provide continuing support for its customers, even on a minor purchase such as a mouse.

Marion Baldwin
San Jose, California

The 30-Day Guarantee: It May Be Shorter Than You Think

After reading an article in *PC World* about a spreadsheet compiler from Resource Analysis International Corporation ["Worksheets Without 1-2-3," March 1988] and speaking directly to the company, we decided to test its product on an unconditional 30-day money-back guarantee.

RAI shipped us *Compile 1 to C* on March 31, 1989, and it arrived at our Toronto office about three weeks later. We tried the product for the next week, encountering several difficulties. I spoke with RAI, and the company agreed to a full refund. The software and all documentation was shipped back to RAI on May 1, 1989.

It has been over eight months now, and payment has still not been received. I have spoken to RAI on numerous occasions and have been assured each time that the money is in the process of being refunded.

Steve Dobronyi
Toronto, Ontario, Canada

Editor's note: Steve Rosenman of Resource Analysis International told Consumer Watch *the company will refund Mr. Dobronyi's money. He added, however, that returned merchandise must be* received *by RAI within 30 days of when the customer receives it in order to qualify for the money-back guarantee. In Mr. Dobronyi's case, he sent the software before the 30 days expired, but shipping delays resulted in the product's being received after that time.*

A 30-day money-back guarantee provides customers with a powerful sense of security when buying products through the mail. Often, however, the guarantee is not as straightforward as it would at first appear. And given some of the restrictions imposed (continues)

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Circle 110 on reader service card

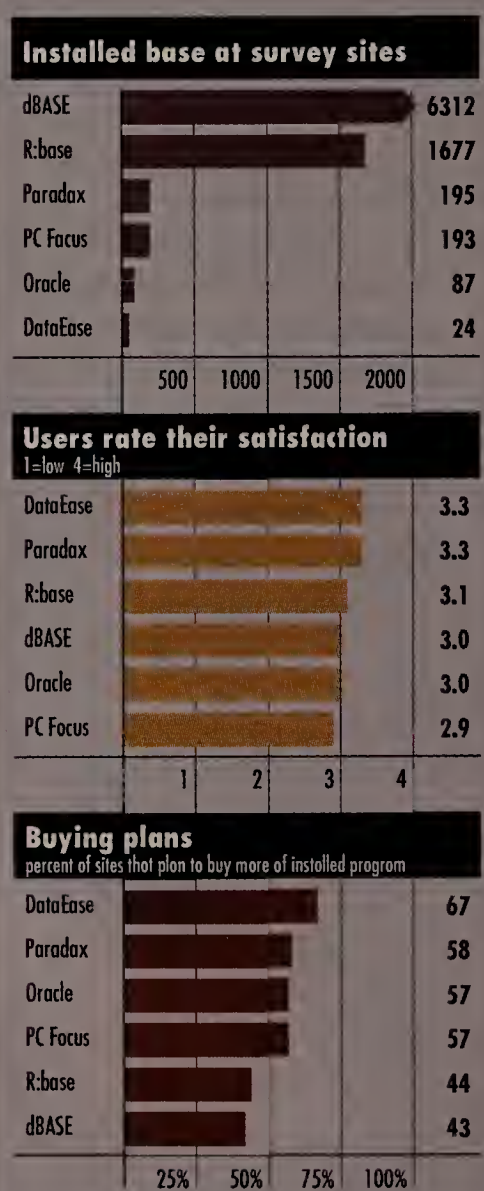
by mail-order companies, the 30-day period can be shortened considerably.

Customers should therefore inquire into the specific details of a company's 30-day money-back guarantee. When do the 30 days start? When does the trial period end? What must you do to ensure that you can exercise your options under the guarantee?

Companies also have a responsibility to inform customers in writing of any caveats to their policies. The bottom line, however, is that if companies are going to advertise a 30-day guarantee, then customers should have a full 30 days in which to evaluate a product.

RATE YOUR SATISFACTION: Data Base Software

Despite delays in getting upgrades out the door, Ashton-Tate continues to dominate the data base market with *dBASE*, according to this survey of 200 large organizations. Competing products, however, such as *DataEase* from DataEase International and Borland's *Paradox*, rate higher in user satisfaction. Among the top six installed data base programs, *DataEase* is the product most customers said they intend to purchase, followed by *Paradox* and *Oracle*.



Source: International Data Corporation. From a survey conducted in the third quarter of 1989 of 200 large organizations, each with at least 50 PCs.

Restocking Woes

Another "catch" in the 30-day guarantee is some companies' practice of levying restocking fees (usually averaging 15 percent) on returned merchandise. Take the experience related by Robert Laird of Tulsa, Oklahoma. He ordered a video board and a monitor from Express Micro Mart in West Bloomfield, Missouri. According to Mr. Laird, the video board he received was an 8-bit board rather than the 16-bit board he had requested. He therefore returned the merchandise and notified his credit-card company to charge back the amount of purchase to Express Micro Mart. Express Micro Mart accepted the returned merchandise, but the following month Mr. Laird discovered that he had been charged a restocking fee of nearly $200.

While no customer likes to pay a restocking fee for returning products within a trial period, it's even more abhorrent to be charged for returning incorrect merchandise. Says Mr. Laird, "If you ordered a product and then changed your mind, that's one thing. But when they never shipped the right merchandise, it's incredible to be hit with a restocking fee."

After reviewing Mr. Laird's case, Express Micro Mart has decided to refund the restocking fee. "If we feel for some reason we are to blame, we will adjust down or eliminate the 15 percent," says customer service representative Irene DeLuca.

Taking Your Case to Court

Eliot Ulman was also levied a restock-

(continues)

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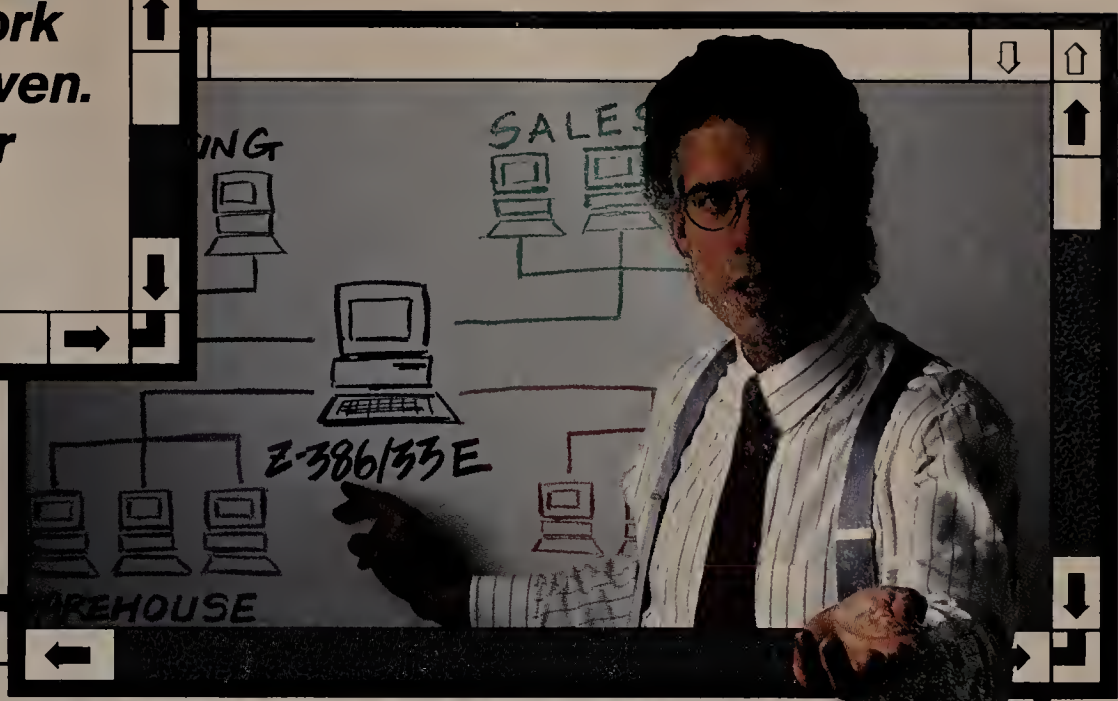

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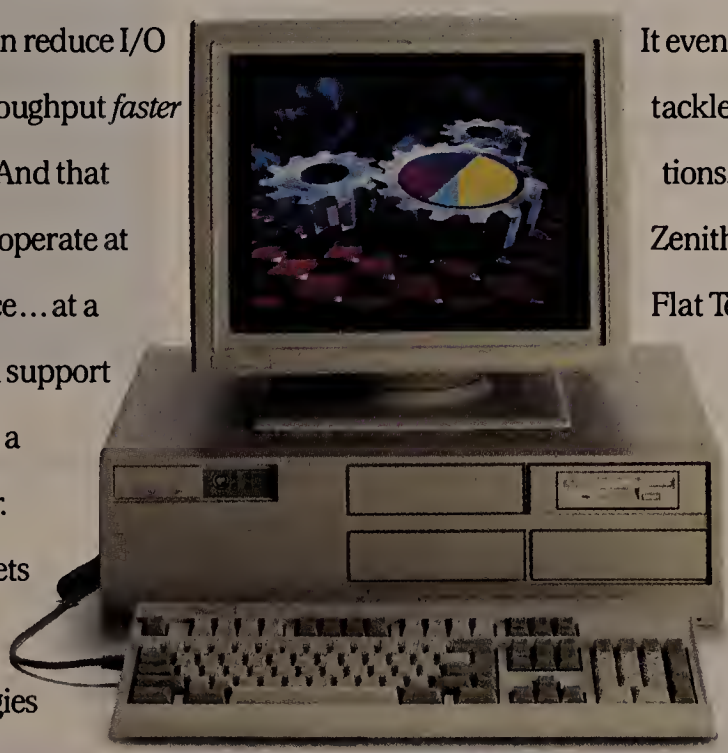
Zenith Data Systems' Intel386™-based EISA network server also lets you choose from a wide range of operating environments, including MS-DOS,® MS OS/2,® SCO™ UNIX® and Microsoft® *Windows/386.* It even includes a VGA video card to tackle specialized graphics applications, which come brilliantly to life on Zenith Data Systems' award-winning Flat Technology Color Monitor.



So if you need an EISA network server that excels in disk-intensive applications, hook up with our Z-386/33E today. For your nearest Zenith Data Systems Medallion Reseller, call: *1-800-553-0350.*

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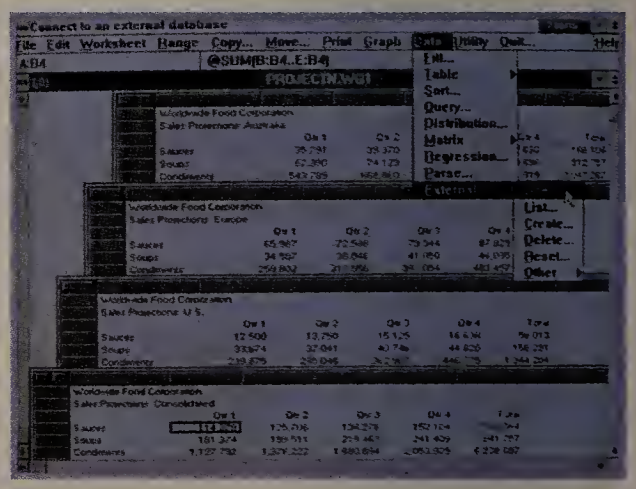

Whether it's working with a 3D file or bringing in information from external databases, the power of 1-2-3/G is always within reach.

Plus, 1-2-3/G takes advantage of the speed, large memory, and multi-

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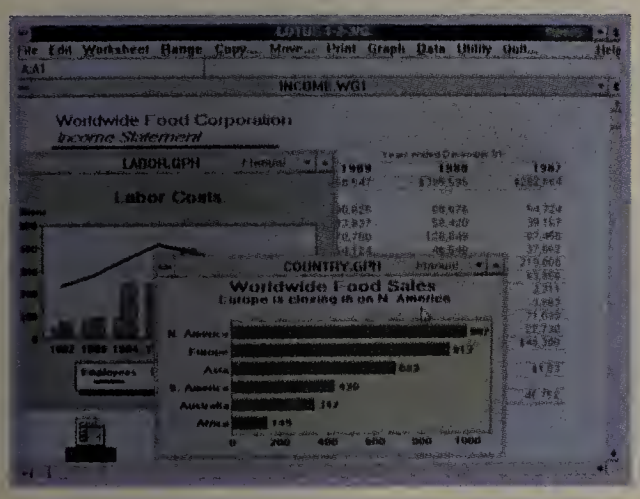
3 minutes into a 1-2-3/G product demo.



1-2-3/G allows you to look at your graphs and spreadsheets simultaneously, and lets you customize them with fonts, colors and borders.

tasking capabilities of OS/2®. And it supports Dynamic Data Exchange, enabling you to swap live data between 1-2-3/G and other OS/2 applications for true application integration.

Not surprisingly, 1-2-3/G received the Best Software Product award at its Comdex preview last fall. And PC World has called it a "new high in spreadsheet technology."

But now it's time to experience it for yourself.

For a free auto-demo or brochure call 1-800-842-8455, ext. 173. And see why your analytical power isn't the only thing 1-2-3/G will elevate.

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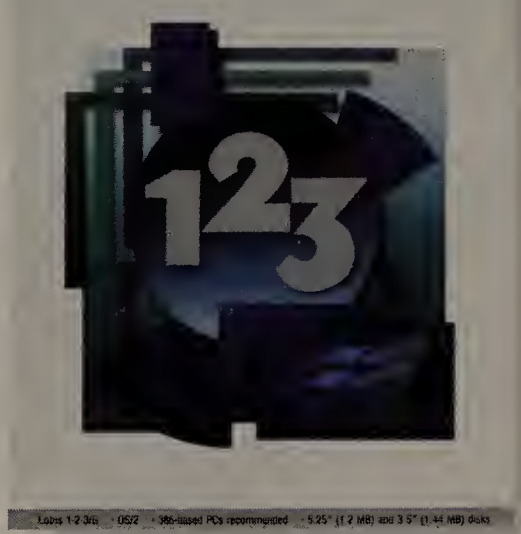

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The New York Times

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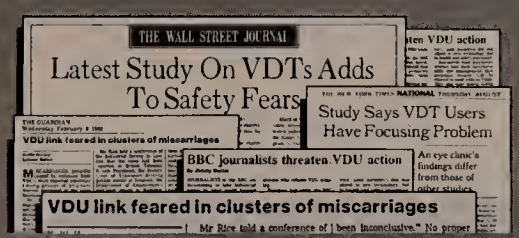
The NoRad Shield is available for all IBM PC and compatible screens, monitors, and displays.



Evidence mounts which shows a connection between non-ionizing radiation and skin irritation, eye damage, and an increase in miscarriages.

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Circle 180 on reader service card

ing fee (for $732.75) after returning a computer purchased from Pacific Computer of San Gabriel, California. But, says Mr. Ulman, the computer "never properly functioned and we considered it defective." So he took his case to small claims court (see *Consumer Watch,* June 1989) and won, receiving a check for both the restocking fee and court costs.

Mr. Ulman says two factors worked in his favor: He went prepared (including presenting screen shots showing various error messages he encountered when using the system), and the vendor did not.

Although small claims court should be considered an avenue of last resort, Mr. Ulman's experience proves it is certainly worth pursuing.

Get That RMA

In another letter, a reader writes of his inability to get a refund from HiTech International, despite having returned the computer he ordered within the 30-day period. In an effort to get the system back to HiTech within the allotted time, he returned it without first getting a return merchandise authorization (RMA) number from the vendor.

HiTech has since refunded the customer's money, *minus* a 15 percent restocking fee, which was charged because the customer failed to "follow proper procedures."

Virtually every company requires customers to call for authorization prior to returning merchandise, with many refusing to even accept the merchandise without the proper RMA number. Specific procedures for returning merchandise are often spelled out on invoices. If you can't find the information, however, call the company before returning anything. It'll save you time and money down the road.

The Gray Market Revisited

Consumer Watch has received several letters in response to the February 1990 column on the hazards of buying name-

(continues)

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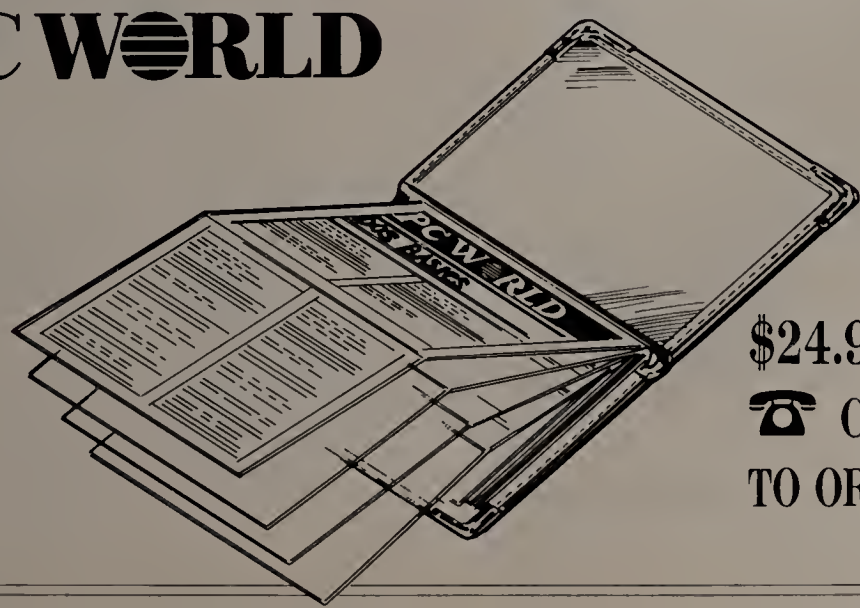

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Ray: Me neither. Don't you s'pose we could hire somebody to write our ads? *(Laughter.)*

Ted Waitt, President

Ted: No, because we've always been straight forward in our advertising. I've analyzed the market and I can't understand why anyone would buy a computer from anyplace except Gateway. Now I know you all agree with me, so I want you to tell the world what you can do for them. Just straight talk from a friend in the business. I'm recording this —

Troy: Is this legal?

Ted: — and I'm gonna give the tape to word processing for a transcription. And that's going to be our ad.

Norm: This oughta be good! (Laughter).

Ted: Todd, you're on. I'm looking for a computer system. Why should I buy from Gateway 2000?

Todd: Because Gateway has the best value. We lead the market in price, quality and service. It's that simple. You wanta get the best system for the best price from a company you can depend on? Then buy from Gateway 2000.

Troy Miller, Plant Manager

Todd Osborn, Sales Manager

Troy: Yeah, shop around. But don't be fooled by stripped-down systems. Compare Gateway feature for feature and we blow the competition away.

Norm: And read the reviews. Our systems out-perform machines that cost twice as much.

Ted: Troy, you're on. You run the plant so you tell me what kind of quality I can expect.

Troy: Well we use a component that's not very common today — *pride.* Each machine that goes out the door is custom-built by one person. That person's pay is determined by how satisfied you are as a customer. We use only top-of-the-line components. You combine that with the midwest work ethic and you've got an unbeatable combination.

Ted: OK, Gateway's got great prices on quality systems. But we can't guarantee everyone that they'll never have a problem.

Ray: If we could, I'd be out of a job. *(Laughter.)*

Ted: Yeah, Ray. Tell me about your job. What happens if a customer does have a problem?

Ray: That's where we shine. Gateway's tech support is the best in the industry. We know what we're talkin' about, but most importantly, we care. We'll bend over backwards to take care of you. You won't hear us saying, "Sorry ma'am, that's a software problem." We don't care whose problem it is. If the machine is not working for you, we'll do everything in our power to get you up and running.

Norm Waitt, Vice President

Ted: What if you can't fix a problem over the phone?

Ray: Then we can send a technician to almost anyplace in the nation.

Ted: Kathy — bet you thought I forgot you — what about customer service?

Kathy: Customers get very personal service here. When you call Gateway, you'll be assigned to one customer service representative who will follow your order from start to finish. Your personal rep will make a special effort to get to know you and make sure you're completely satisfied.

Norm: Hey, this sounds almost too good to be true.

Ted: Some people think that. But our customers don't — ask them. They know Gateway 2000 is the best value in the industry.

Norm: Do we have an ad yet?

Ted: Yeah, I think so. All I have to do is cut some prices on our systems. Then get ready for a really hot summer...

(Tape End Indicator.)

Kathy Skidmore, Customer Service Manager

Ray Kayl, Technical Support Manager

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brand systems from unauthorized dealers. Several authorized dealers wrote, objecting to our argument that hardware manufacturers should honor their warranties *regardless* of where the customer purchases a system. One dealer wrote, for example, that such warranty restrictions are one of the few means he has of competing with mail-order firms that offer the same systems at substantially lower cost.

Robert Dalldorf of San Luis Obispo, California, wrote to *Consumer Watch* of problems he was having getting repairs done on a PS/2 Model 30-286 purchased from Arlington Computer Products of Mount Prospect, Illinois, despite the fact that he was still within IBM's one-year warranty period. After investigating the matter with IBM, Mr. Dalldorf learned of IBM's policy to "not repair equipment purchased from an unauthorized dealer."

Arly Guenther, president of Arlington Computer Products, told *Consumer Watch* that his company would repair the system, although its six-month Arlington warranty had expired. He added that the company now mentions in its advertisements that IBM and Compaq systems are warranted only through Arlington.

Wells American, Take Two

In April, *Consumer Watch* wrote of the demise of Wells American Corporation of Columbia, South Carolina. After drastically curtailing operations, the company informed callers in a recorded message that warranty repairs would be handled by Compusciences of Lexington, South Carolina.

Consumer Watch has since learned that Compusciences, which is staffed by several former Wells employees, is a subsidiary of Wells American. Customers report delays of up to three weeks in getting calls returned from Compusciences, but they have not encountered service problems.

Despite repeated attempts to reach Wells American officials, our calls have not been returned. We have, however, spoken with former Wells American customers who express frustration at never having received any notice from the company regarding its change in status, even though the customers' products were still under warranty.

One dealer said that warranty restrictions help him to compete.

"It's terrible the way Wells has handled this, [and] it hurts other companies," says Dennis Clark, who bought four systems through Wells and is still owed some memory modules from the company. "It's the perfect example of

(continues)

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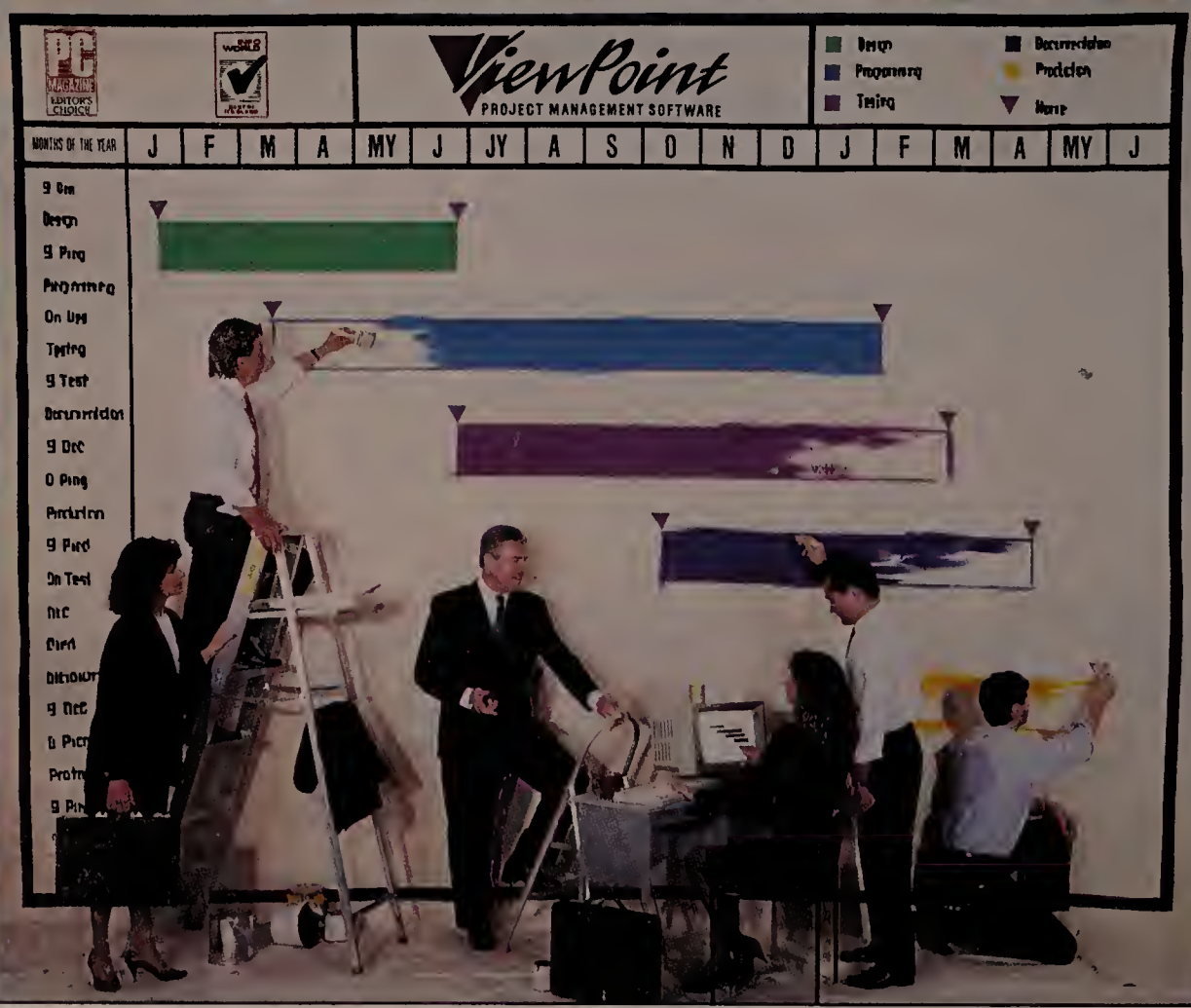

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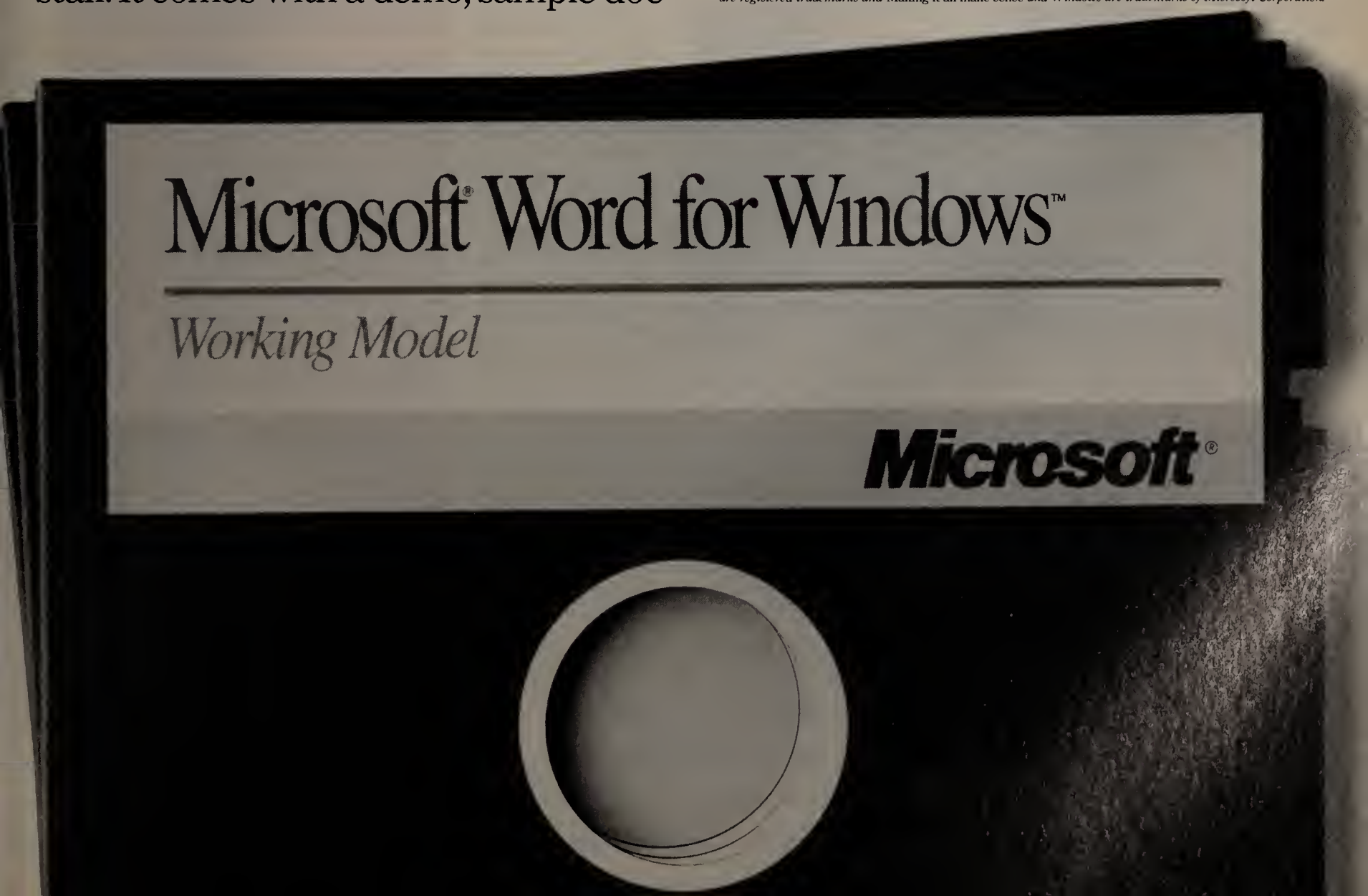

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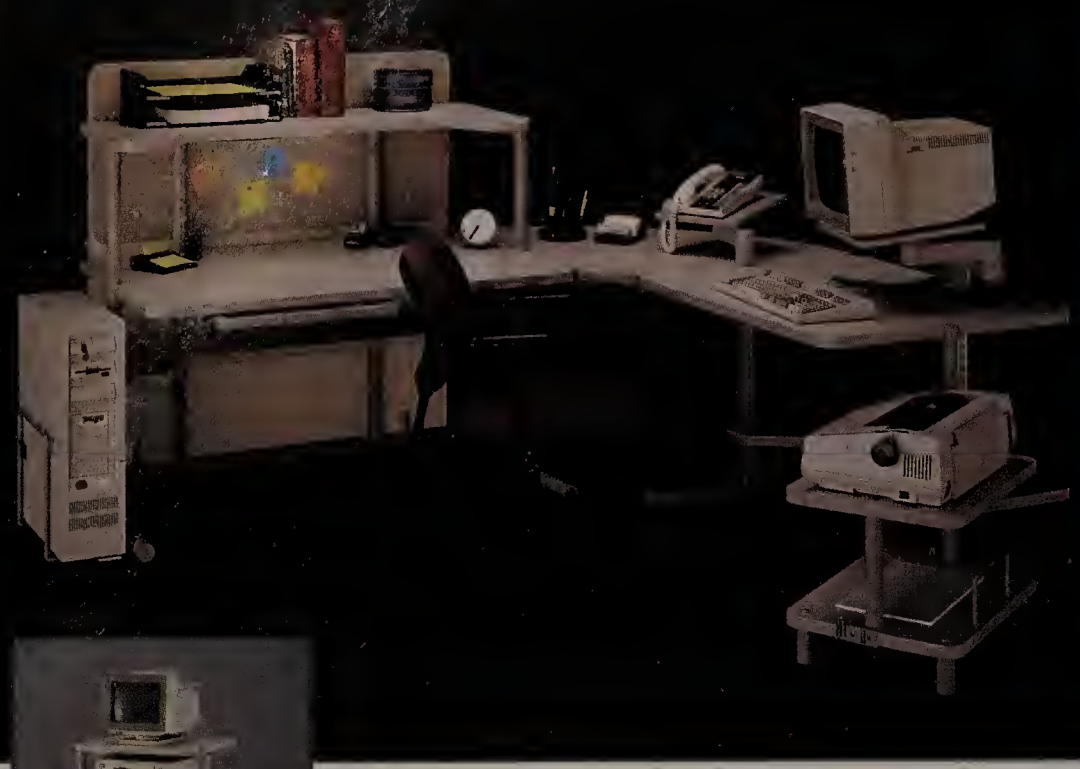

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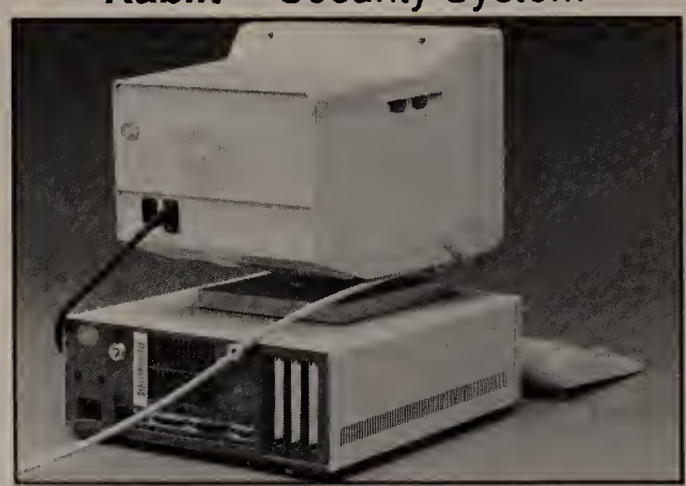

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why people buy IBM and Compaq. You know they're going to be around for a long time."

Customers in need of service for Wells American systems should call Compusciences at 803/796-5760.

Consumer Watch is interested in hearing from Wells American customers regarding their experiences with the company's sales and service.

Take action! If you've got a complaint or a compliment, send it to Consumer Watch. *We'll follow up and publish letters with the broadest interest. For more information, see How to Contact PC World, page 4.*

POWER TIP NO. 105

A Universal Bullet

Your lists will be more readable if you put a bullet at the beginning of each item. A small but serviceable bullet character can be accessed from inside most word processors and printed on any printer that supports IBM's extended ASCII character set. To insert this bullet into a document, hold down the **<Alt>** key while you press **249** on the numeric keypad. When you release the <Alt> key, the bullet will appear.

The size of this bullet varies greatly between different printers and fonts. In some cases, pressing **250** instead of '249' will give you a larger bullet, while **254** may give you a square one. Most word processors allow you to use a macro to automate the process of creating bullets.

Garen Thatcher
Hewlett-Packard
Sunnyvale, California

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Source: Byte Magazine

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DesignCAD 3-D and DesignCAD 2D are available from most retail computer stores, or you may order directly from us. If you have questions about which program to purchase please give us a call. All you need to run DesignCAD 3-D is an IBM PC or compatible computer with 640 K RAM memory and a hard disk. Both products support most graphics cards, printers, plotters and digitizers. Free Information and a demo disk are available by faxing (918) 825-6359 or telephoning:

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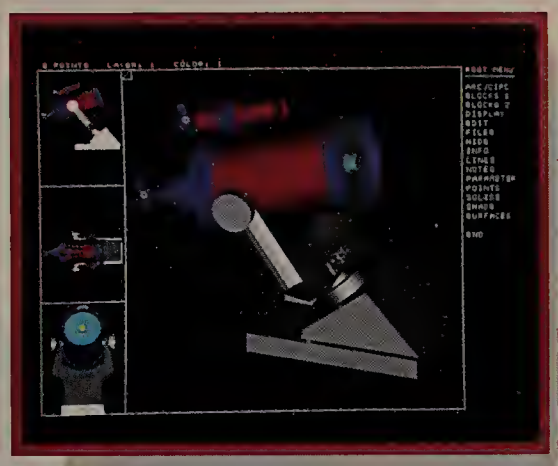

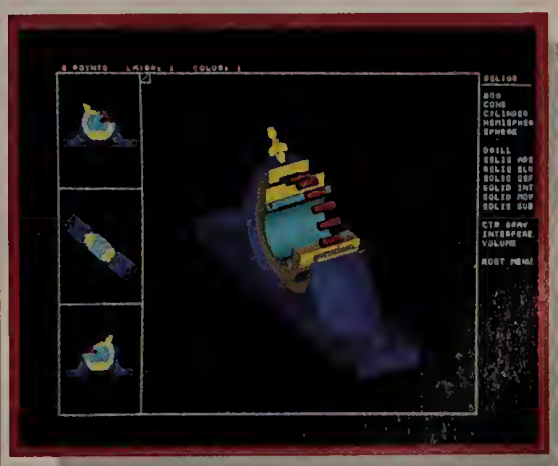

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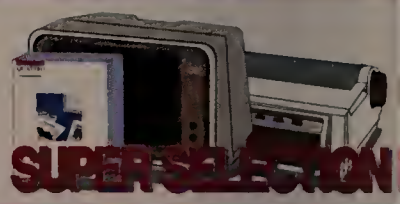

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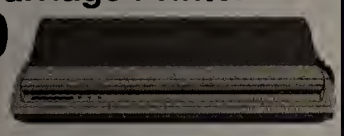

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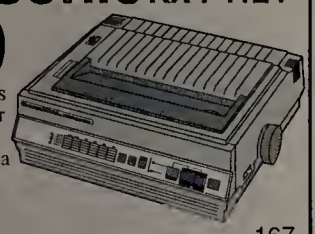

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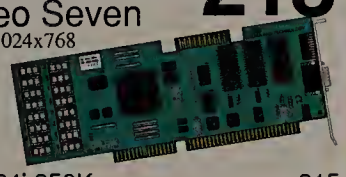

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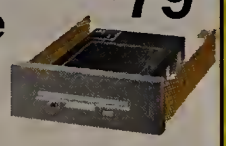

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Circle 236 on reader service card

Edited by ERIC BENDER

Shortages Easing?

Intel Monopoly Threatened

Other Firms to Clone 386, 486

As the sole supplier of 386 and 486 processors—the basic building blocks of advanced PCs—Intel enjoys one of the few monopolies in American business.

But component manufacturers and PC makers alike point out that Intel hasn't made good on its claim to provide all the chips the industry needs, at consistently lower prices. In recent months, they complain, small PC makers have gone wanting as Intel failed to meet demand and diverted more of its production efforts into its own systems group. The giant chip maker says the shortfall should end by midyear, but its clients still feel vulnerable, and some are looking elsewhere.

"Intel controls the most important part of the computer ...and will sue anybody who [makes] something similar," charges Joseph Chan, president of Spear Technology Holding Company in Milpitas, California. Spear, a system supplier that found itself unable to buy 386 chips at a reasonable price, has threatened legal action against Intel for alleged unfair business practices.

While Spear and other suppliers would like a second chip source, cloning Intel's powerful microprocessors is a complex process, says Michael Slater, editor and publisher of the *Microprocessor Report* in Palo Alto, California. It isn't enough to simply replicate a chip's documented functions, he explains, because Intel may not document all capabilities.

But several firms have launched serious efforts to create compatible alternatives. Among them, Integrated Information Technology (IIT) of Santa Clara, California, is working on a "486-like product," says Gene Parrott, vice president of sales and marketing. Founded in 1987, IIT now sells clones of Intel's 80287 and 80387 math coprocessors.

Veteran chip supplier Advanced Micro Devices (AMD) is in court with Intel over the rights to manufacture exact replicas of Intel's 386 microprocessor (AMD is an Intel-licensed second source for the 286 chip). AMD is also rumored to be working on its own design, just in case it loses in court. The company won't comment on any such activities. A spokesperson does note that the entire 8086 family is "one of the three core businesses for AMD. We do not intend to abandon our core business."

NexGen Microsystems of San Jose, California, is developing a microprocessor that the company claims will run all DOS and OS/2 software and operate twice as fast as the 486 at any clock speed, although it won't be plug compatible with the Intel chip. NexGen's backers include Compaq, but NexGen aims to sell systems rather than microprocessors, says Peter Janssen, vice president of marketing.

Another NexGen investor, Chips and Technologies, may create its own microprocessor design. "It has strong business reasons to have a processor," says Slater, noting that Intel and other silicon suppliers are starting to combine both the chip set and the CPU.

Slater doesn't expect volume shipments of Intel-compatible microprocessors until early 1991. He believes that if a competitor can design a CPU that works well and is free of compatibility problems, there will be strong demand for it. He adds that "the burden will be on system manufacturers to do exhaustive compatibility testing."

Although the increased competition may not result in a drop in system prices, consumers may see a quicker shift toward faster, more powerful chips driving their PCs. However, PC manufacturers may shy away from non-Intel parts. "In the clone market, [it's important] to have quality, high-end components," says one company representative. "Having genuine Intel parts sets us apart." —*Roberta Furger*

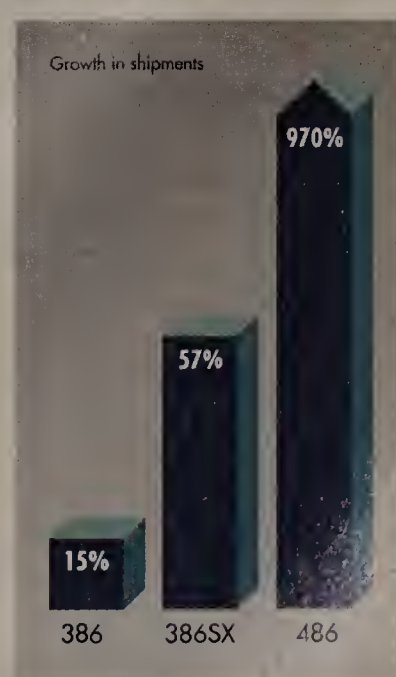
Would-Be CPU Cloners

Company	Current business
Advanced Micro Devices	CPU manufacturer; licensed 80286 maker
Chips and Technologies	Chip set manufacturer
Integrated Information Technology	80287- and 80387-compatible math coprocessor manufacturer
NexGen Microsystems	Start-up designing own CPU and systems

Several Silicon Valley firms are expected to forge alternatives to Intel's 80386 and 80486 CPUs. Clone chips aren't expected until early next year.

TIM CARROLL

Boom Times Ahead for Powerful PCs



The market for 386- and 486-based PCs is growing quickly, attracting rivals for Intel. These are Dataquest projections for compound annual growth for 1989 to 1993.

Font Flurries Promise Confusion, New Options

Competition Means Lower Prices

From a technical viewpoint, the future of PC fonts couldn't be clearer: Font-rendering software that's plugged directly into *Windows* or OS/2 will let you create fonts on the fly, in any size, from any application, for both screen and printer.

But whose font software? IBM and Microsoft are telling different stories. And they don't control the other half of the font equation—laser printers—where market-dominating Hewlett-Packard is pushing a third approach.

While all these players give lukewarm endorsements to each other's font plans, plenty of confusion remains. What will become standard in *Windows* and OS/2? And how can users make their documents portable across different environments?

IBM formalized a three-way struggle in March by licensing Adobe's PostScript Type 1 font-rendering technology for OS/2 and other major platforms. Adobe itself is expected to launch a corresponding Adobe Type Manager package for *Windows* as soon as *Windows 3.0* ships; this will create fonts for both PostScript and LaserJet printers.

But Microsoft chose instead to work with Apple on creating the alternate TrueType font technology and its associated TrueImage page description language. (TrueImage will support TrueType and PostScript Type 1 fonts.) And Microsoft will embed TrueType not only in OS/2 but also in *Windows*, as soon as year-end. Microsoft also will license TrueType to DOS application vendors, although its adoption will be limited by the need to customize each application and by rival technologies.

Meanwhile, Hewlett-Packard's hot-selling LaserJet III, with its PCL 5 page description language, incorporates Agfa Compugraphic's Intellifont technology. PCL 5 won't get as fancy as PostScript or TrueImage, but it looks more than adequate for mainstream PC users. And, with OS/2's open font architecture, Intellifont should work just as cleanly as TrueType and PostScript fonts. HP is working on a similar offering for *Windows*, but that's trickier because the *Windows* architecture is closed and Microsoft is not keen on alternatives to TrueType, says Walt Sledzieski, third-party programs manager at HP's Boise, Idaho, printer division.

HP sells about twice as many laser printers as all other suppliers combined, notes Rob Auster, analyst with BIS CAP International in Norwood, Massachusetts. That means IBM and Microsoft must accommodate Intellifont, but "can the tail wag the dog?" he asks. Robert Romney, president of software developer Zenographics in Irvine, California, adds, "Suppose HP sells a million LaserJet IIIs this year—should they build a [more powerful] Intellifont 2? That is a very difficult question."

The answers depend more on market factors than on technical issues, as the split between IBM and Microsoft shows. As of this writing, IBM and Microsoft don't agree which technology will be standard across all manufacturers' versions of OS/2 2.0—if any. IBM is in the driver's seat, but Microsoft has shown absolute mastery at turning such partnerships to its own advantage.

In *Windows* as well, "there won't be one winner," Auster says. And third parties are planning attractive font alternatives for *Windows* and OS/2. One example is *SoftType* from Z-Soft in Marietta, Georgia, which offers 62 scalable fonts for $199.

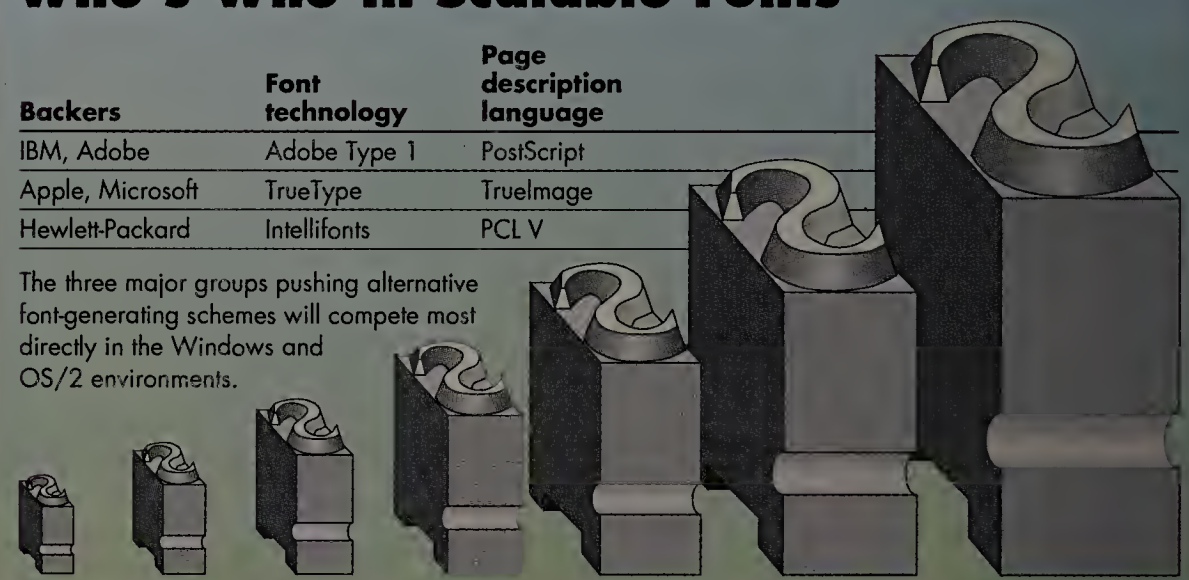
As *SoftType*'s price indicates, competition is driving down font costs dramatically. "Suppliers are charging end users a premium over what professional typesetters pay, and that will end," predicts John Hild, president of XyQuest in Billerica, Massachusetts. Bundling will accelerate this trend—Microsoft will ship 13 TrueType scalable fonts with *Windows* and OS/2, for instance. "For many desktop users, that will be enough, and the cost of the technology goes to zero," says Dennis Adler, fonts manager in Microsoft Corporation's printer division.

Customers still must consider how they can move documents between DOS, *Windows*, OS/2, and the Macintosh. Here again, the questions revolve around printers as much as around software. "The trouble won't be *Windows* versus the Mac, it will be *Windows* with a LaserJet versus the Mac with a [PostScript-based] LaserWriter," notes Ted Johnson, manager of *PageMaker* development at Aldus in Seattle. At the moment, with no TrueImage printers in sight, PostScript remains the closest thing to a font lingua franca. —*E. B.*

Who's Who in Scalable Fonts

Backers	Font technology	Page description language
IBM, Adobe	Adobe Type 1	PostScript
Apple, Microsoft	TrueType	TrueImage
Hewlett-Packard	Intellifonts	PCL V

The three major groups pushing alternative font-generating schemes will compete most directly in the Windows and OS/2 environments.



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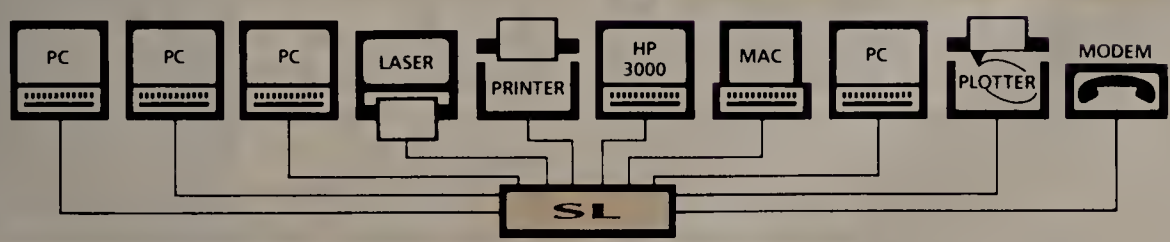

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Have PC Prices Hit Rock Bottom?

Dealers Struggle to Survive in Face of Low Margins

PC Street Prices Plunge

	January 1989 street price	January 1990 street price	Current suggested retail price
IBM Model 50 Z-31	$2865	$2471	$3995
IBM Madel 70 386-A121	$8085	$6326	$8995
Compaq 386s	$3616	$2823	$4199
Compoq 386/20e	$5105	$4528	$6099

Best-selling bronds have shawn a strang year-to-yeor decline in street prices, occording to Storeboord/Camputer Intelligence. Volume buyers can usually negotiote for still deeper discaunts. Mareaver, in same cases the January 1990 prices don't reflect odditional memory ond/ar faster staroge that's now offered os stondord.

Corporate buyers and other hard bargainers may find the bargaining a little harder this summer, especially on IBM PS/2s and Compaq Systempros. With profits cut to the bone, dealers insist that they need to get a few margin points back from their best customers—or find another line of work.

Dealers have been selling PS/2s to volume buyers at better prices than IBM's own direct sales channel offers, grouses Howard Lefkowitz, president of HLA/Connecting Point Computers in Beltsville, Maryland. He seldom bids on the many large accounts around Washington, D.C. because of the cutthroat price competition. "IBM won't give you 40 points off, but a lot of dealers will," Lefkowitz says.

That margin is about the most attractive discount the highest-volume dealers can get from IBM and other vendors. For the past two years, many dealers have sold at or near cost, living off the market development funds and special added discounts that companies like IBM give to aid sales to the Fortune 500. Some dealers have even given Fortune 500 clients a piece of those discounts—in IBM's case, 6 percent of suggested retail prices.

However, IBM dropped the added-discount program at the start of the year, and purchase contracts under it will expire by summer. In fact, Big Blue, Compaq, and others are trying to rein in discounting by reducing the number of dealer pricing tiers and placing more controls on market development funds, says International Data Corporation (IDC) distribution analyst Lee Levitt. Too often these funds have been "brought to the bottom line," as Levitt puts it, rather than actually spent on market development.

The dealers will be hard-pressed to compensate by reducing the discounts they offer. Demand is soft: PC sales have grown less than 15 percent in each of the past three years and are expected to grow only 9 percent this year, points out IDC analyst Bruce Stephen. At the same time, users evince little sympathy for the dealers' plight.

"If our supplier tried to change our discount, we would just bid another supplier," says Mike Guhasz, PC specialist with McDonnell Douglas Aerospace Information Services in Long Beach, California. His firm is "looking for the most bang for the buck," he adds, and has responded to stabilizing PS/2 prices by evaluating AST Research computers.

Jim Hansel, vice president of Chase Investors Management Corporation in New York City, says he doesn't need to sacrifice service for price: "There is a competitive market throughout most of our network of suppliers, and it won't be possible for anyone to hold us up."

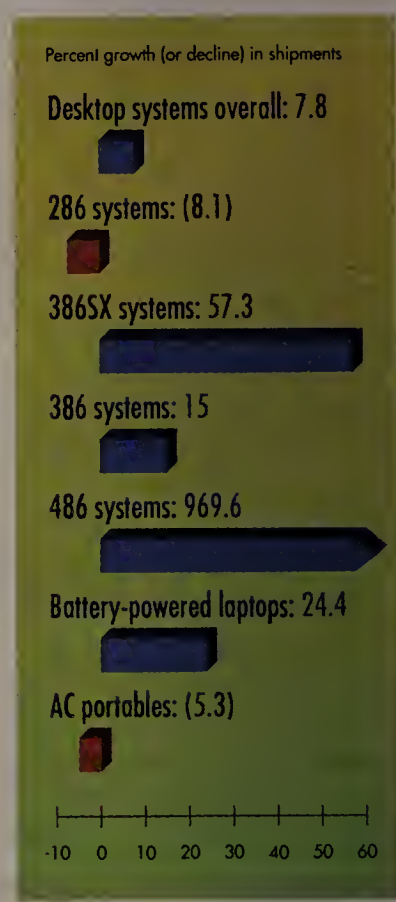
Seymour Merrin, president of Merrin Information Services in Palo Alto, California, expects some shift from IBM to compatible hardware and moderate price increases, but mostly hard times for dealers. Squeezed between rising costs and customer refusal to pay more, less nimble dealers will be forced out of business or into mergers this summer, agrees Stephen.

Businessland, which had a rough year in 1989, is concentrating on adding value; 15 percent of a salesperson's quota now must come from services or high-end products. Look for most dealers to follow suit, says Stephen, and to push into products like networks that require sales consultation, installation, maintenance, training, and support—maybe even software customization.

In this climate, defensive buyers may want to trade a little margin for a quality relationship and the security of knowing that their suppliers won't be priced out of existence, says Merrin.

That's the hard lesson that Dow Chemical's Texas Operations learned after buying a number of ATs strictly on the basis of price, says Terry Frazier, group leader for R&D computing. Dow saved $100 to $200 per machine, but a 30 percent–plus breakdown rate has convinced Frazier that it's possible to be penny-wise and pound-foolish when purchasing PCs in quantity.
—*Mike Hogan*

PC Market Changes Shape



Soles of bottery-powered laptops will continue to grow faster thon soles of desktop ond AC portoble systems, but among desktop computers, shipments of 386SX ond 486 systems will increose at phenomenal rates. These figures ore Dotoquest estimotes for compound onnuol growth for 1989 through 1993.

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3Com Scrambles to Stay a Network Leader

Will Focus on Hardware, Downplay LAN Manager

At a repositioned 3Com, Executive Vice Presidents Robert Finocchio, Leslie Denend, and Eric Benhamou emphasize the company's strengthened focus on integrating networks in multivendor environments.

JOHN HARDING

3Com Corporation has an image problem. One of networking's pioneers, the company has sold more than a million network adapter cards, but few users recognize its name because its products are sold primarily through resellers who repackage them into larger networks under different monikers.

The Santa Clara, California, company means to rectify that problem by revamping its sales strategy and tightening its overall product focus. The goal, say executives, is to be a leader in network integration, offering a range of products designed to hook together multivendor environments—from adapter cards to servers to products that link multiple LANs in an enterprisewide network.

In the quarter ended February 28, 3Com posted sales of $107.3 million (almost identical to previous-year results) and income of $6.7 million (down from $10.7 million a year earlier). Trying to escape this flat-sales syndrome, 3Com reduced its product line earlier this year. "We had spread ourselves too thin and were not having sufficient impact as a result," says Eric Benhamou, executive vice president of product operations. The company will concentrate on communications and network servers (including *LAN Manager* software), electronic mail, adapter cards, connectivity services, hub systems, and internetworking and network management products.

One of 3Com's traditional strengths is its adapter business, where it's the leading provider of ethernet hardware, says Dataquest analyst David Perro. 3Com will focus on providing ethernet products for AT, Micro Channel architecture, and Extended Industry Standard Architecture buses.

3Com also offers solid server products. Although historically these products have supported only its own networking software, 3Com now plans to support Novell's NetWare, a move that could widen its customer base considerably. 3Com will face increased competition in the dedicated server market, however, as PC makers start to jump into this area.

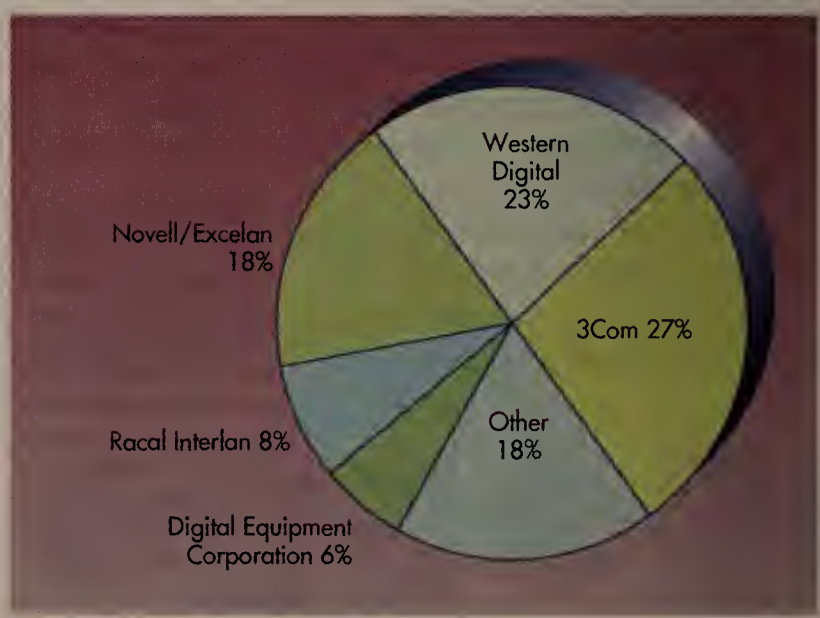
Late last year, 3Com relinquished its position as the codeveloper with Microsoft of the core *LAN Manager* system software. It will focus instead on providing "value-added services," says founder and marketing vice president Bob Metcalfe. "We are fully committed to *LAN Manager*," he says, but as a network integrator rather than a player in the system software game. "3Com used to be Novell's competitor in network operating systems," says Metcalfe. "Microsoft is Novell's competitor now."

"3Com has lost its leadership role in the *LAN Manager* movement," says David Marshak, a consultant with Patricia Seybold's Office Computing Group in Boston. With other vendors offering their own versions of *LAN Manager*, Marshak questions why a customer should buy from 3Com. He adds that the initial release of the *LAN Manager*–based *3+Open* was "very buggy," a problem that was compounded by inadequate reseller training and support.

Marshak believes that service and support problems are the biggest hurdle for 3Com to overcome. "[The company] has excellent products, but it's difficult to overcome a rap of bad service and support," he says. Metcalfe responds that 3Com has had difficulty supporting its full product line in the past, but that the refocusing will help solve those problems.

On the sales front, 3Com wants to increase volume through value-added resellers (VARs). Robert Finocchio, executive vice president of field operations, believes that with larger, more complex networks come increased needs for value-added distribution. So while dealers will continue to sell 3Com products, the emphasis will be increasingly on VARs specializing in networks. "It's not a case of just drop-shipping pallets of software," he says. —*Roberta Furger*

3Com Rules in Ethernet Land



3Cam has hung on ta its lead in warldwide shipment of PC network adapters, according to 1989 estimates from International Data Corporation.

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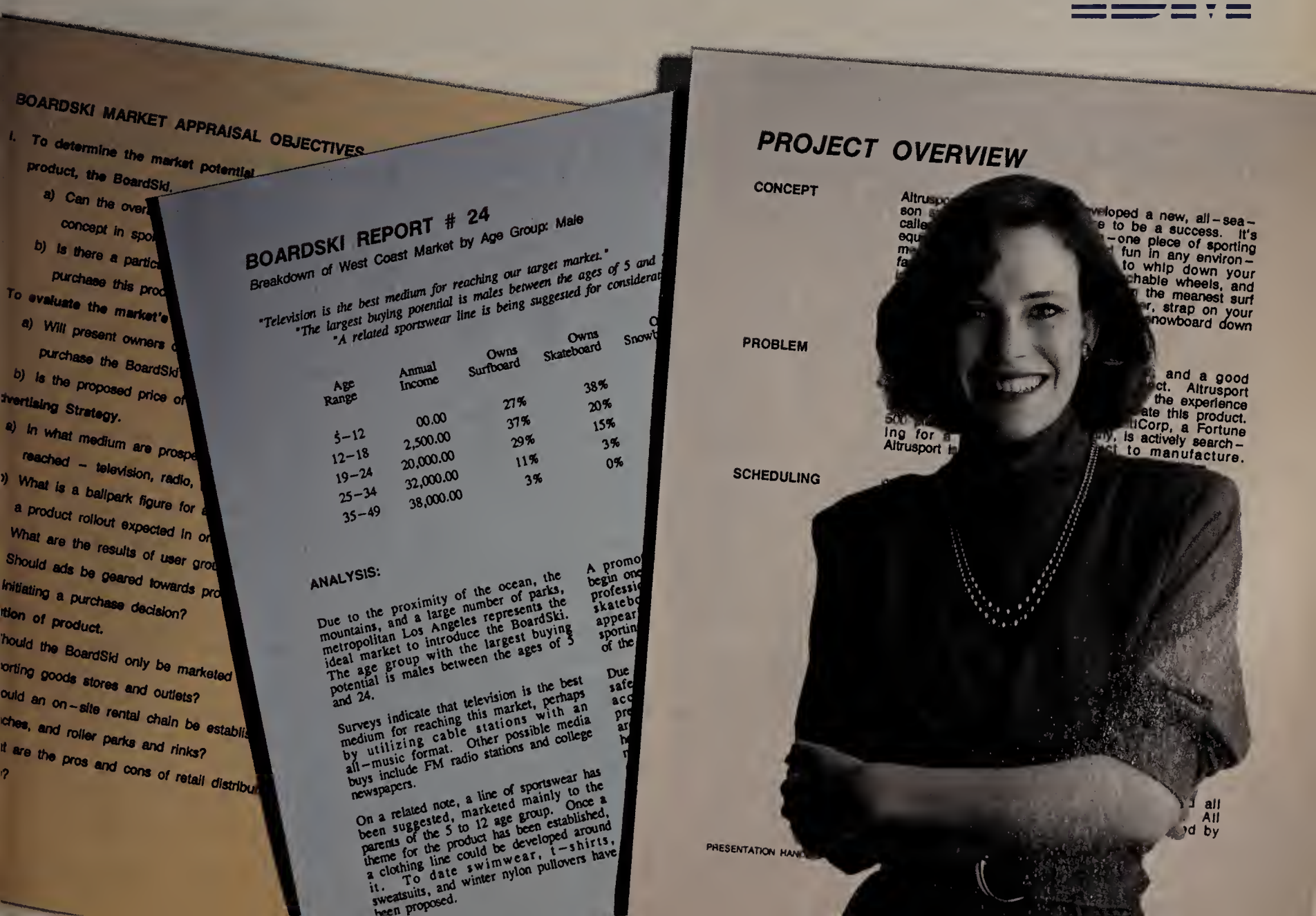


Net packages "will separate the wheat from the chaff" among resellers, says MicroAge's Bruce Grant.

DAN HUNTING

Resellers Gear Up for Sophisticated New Networks

Support Needs Challenge Dealers

Installing local area networks is a tricky business, and horror stories abound. The difficulties will grow with the spread of sophisticated run-your-business systems based on new hardware like the Compaq Systempro, net software like NetWare 386 and *LAN Manager*, and client-server application tools like *SQL Server*. Will the resellers now grappling with nets offer the required support?

The new nets "will separate the wheat from the chaff" among resellers, predicts Bruce Grant, vice president of technical support at MicroAge Computer Stores in Tempe, Arizona. "These won't be like today's nets, where customers can still limp along for a time if there's a problem."

"There's a difference between good support at the PC level and good support when you're building these mission-critical applications," notes Arun Gupta, president of DataEase in Trumbull, Connecticut. "Some resellers will rise to the challenge of selling, say, *SQL Server*, but users aren't ready to buy from a dealer right now. It really requires a system integrator to put together the solution."

Among the technical hurdles is hardware setup: "I challenge you to find much in common among these 486-based machines," Grant says. "Compatibility is the exception rather than the rule with the high-end servers." Different I/O, memory, and processor bus architectures will complicate net configurations dramatically.

Next-generation system software like NetWare 386 and *LAN Manager* was designed with an eye to ease of installation and maintenance, but that's only a first step in net software. "NetWare 386 is in many ways just as easy, or easier, to install than NetWare 286," says Steven Guengerich, editor of *NetWare Advisor* in Houston. "What's a pain is getting your applications up."

"We're moving into an era when application support will become as important as hardware support," Grant says. Client-server products like *SQL Server* and *Oracle Server* "aren't necessarily harder to install than traditional data base management systems, but they are harder to tune." Adds Jack Armstrong, director of new technologies at Corporate Software in Canton, Massachusetts, "There just aren't a lot of people today with that expertise."

Fortunately, the leading vendors are serious about improving reseller training and certification for all of these products.

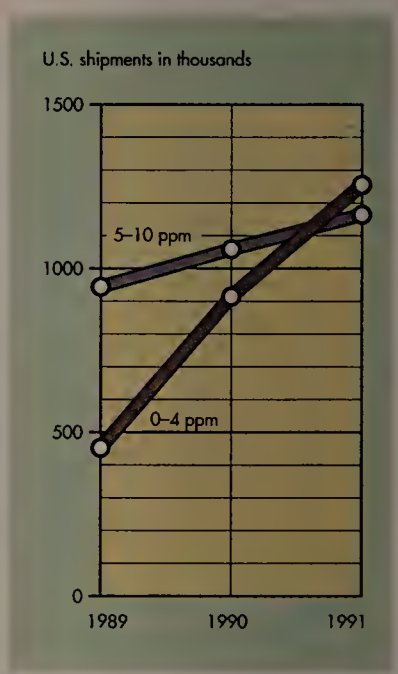
Compaq has invested heavily in training dealers for the Systempro, and the training "is new in the sense that it goes beyond the hardware and talks about the environment," Grant comments. Compaq also has worked to ensure that only properly trained resellers offer its high-end server.

David Thomas, head of IBM's National Distribution Division (NDD), points out that "unless they're really specialized elsewhere, every dealer has to be in the network business. We've spent a lot of dollars training the channel." NDD plans to provide a greater number of advanced courses, partly by opening up offerings previously restricted to IBM technical staff. But IBM isn't planning to change its certification process to reflect training on high-end products, says Larry Deaton, NDD's director of market support.

Customers should draw up a complete, careful plan for net installation and maintenance before they buy anything, advises Grant. He also recommends checking that the reseller is experienced with net installations and strongly committed to the new products. Often the issue is quick response rather than technical know-how, he adds. "Can the reseller really get on site fast? Can they really do remote diagnostics?"

Another concern is that cost estimates for these advanced installations don't always inspire confidence, cautions Laura Burns, senior technical support manager at Corporate Software. That risk is "part of being on the bleeding edge." Still, DataEase's Gupta points out that the new systems often will handle jobs that previously required minicomputers or even mainframes, for a much reduced price. "The technology is not only revolutionary, it works," he says. —*E. B.*

Paced by HP, Personal Printers Take Off



U.S. sales of low-end "personal" laser and other high-resolution graphics printers are climbing rapidly, according to BIS CAP International. Shipments of midlevel models are also showing healthy increases. The leading supplier, Hewlett-Packard, continues its remarkable dominance of the midlevel arena, with more than 65 percent of sales by BIS CAP estimates.

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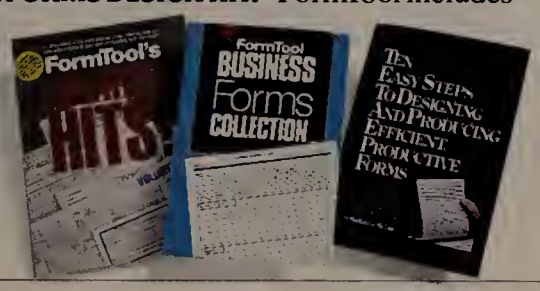

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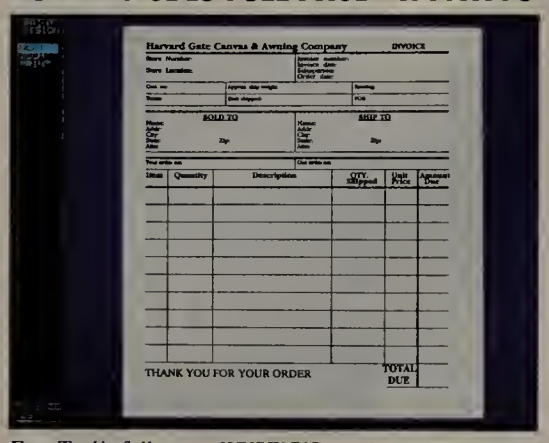

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Circle 20 on reader service card

Intelligent Controllers Get Warm Welcome as Bigger, Faster Hard Disks Proliferate

Power-Hungry Tasks Benefit From Hardware Caching

Distributed Processing Technology's Steve Goldman expects caching controllers to become common in top-of-the-line PCs.

WALT JOHNSON

Today's powerful PCs often come with disk caching software that speeds performance by figuring out which data you'll need next and storing it in system memory, which can be read much more quickly than the hard disk. Increasingly, however, vendors are putting caching hardware right on the disk controller itself, claiming that this offers advantages over caching via software.

A disk controller equipped with dedicated memory and processor can reduce typical disk access times to less than a millisecond, and proponents say the controllers beat software utilities by employing better caching algorithms. Additionally, vendors say, you can devote more memory to caching than your system memory can spare for a cache utility, and you can avoid some system configuration hassles as well. Like the utilities, intelligent controllers also offer the side benefit of prolonging disk life by minimizing actual disk reads.

A caching controller can cut processing time by 75 percent on disk-intensive jobs like CAD drawings and data base indexes, says CompuAdd, an Austin, Texas-based firm whose $495 HardCache/ESDI card has become one of its hottest sellers. Eric Weber, engineering manager for caching controllers, says that any new system configured for an ESDI drive—with 330MB of storage or more—is a candidate for a caching controller.

"The incremental cost over a standard ESDI controller is not that much," says Weber. He adds that if disk access is the bottleneck for an application, upgrading the CPU may be irrelevant, but that an intelligent disk controller may boost performance by a factor of two or three.

Michael Scheidell, president of systems integrator Florida Datamation in Boca Raton, Florida, relies on caching controllers for multiuser medical office and manufacturing installations. The company taps the CompuAdd card and SmartCache products from Distributed Processing Technology (DPT). In a network file server, multiuser, or CAD system, the investment is a must, says Scheidell.

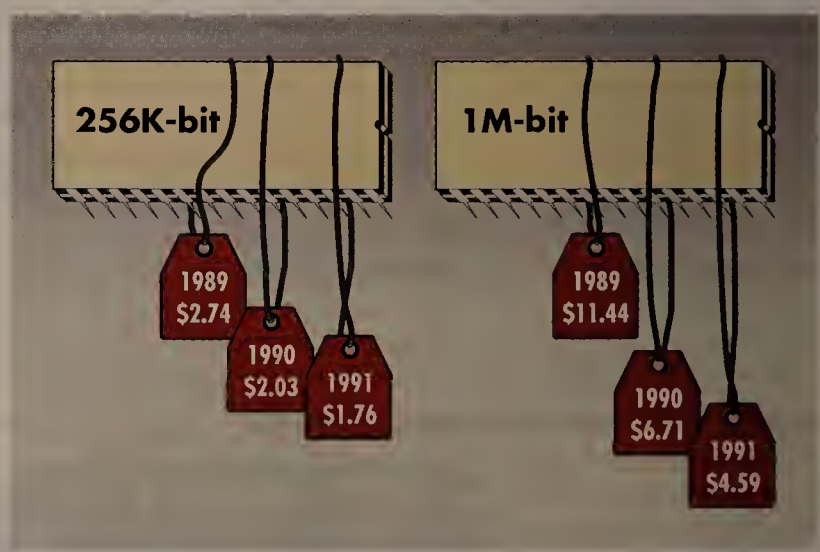
DPT of Maitland, Florida, is one of the oldest players in the field, with a feature-laden and pricey line of disk controllers. DPT's $1200 controllers come with 512K of memory that can be boosted to 16MB. "A controller with this kind of power was overkill for the PCs that were selling back in 1985," notes DPT president Steve Goldman. Today, the controllers are popular for high-end applications where the server or multiuser host requires intelligent control of more than two hard disks or other storage devices.

Caching controllers can cut processing time by 75 percent on disk-intensive jobs like data base indexes and CAD.

Zenith and ALR were the first major system suppliers to offer caching controllers on high-end systems. IBM recently entered the fray with its 32-bit SCSI caching controller for all 386-based PS/2s. Other system suppliers, however, haven't adopted the technique. At the high end, Compaq engineers decided instead to exploit the Systempro's vast memory capacity. Caching utilities and the incremental improvements of ESDI technology meet the needs of standard PCs, say makers such as Tandy, which has no plans to market a caching controller.

But Goldman says DPT is working with several large manufacturers on EISA products to be released this year. He predicts that standardization on the EISA bus will help make caching controllers common in top-of-the-line machines. Such products recently overcame one major hurdle—the need for special drivers and the attendant complicated installation—by settling on compatibility with Western Digital disk controller chips. —*Mark Henricks*

Memory Prices Shrink



After a roller-coaster ride in the late 1980s, PC memory costs will probably drop in a fairly orderly fashion starting midyear, predicts In-Stat. Shown here are manufacturers' prices for individual chips. The 256K-bit and 1M-bit chips are now being joined by 4M-bit varieties. But those higher-density models are selling in low volumes at high cost (more than $47 per chip).

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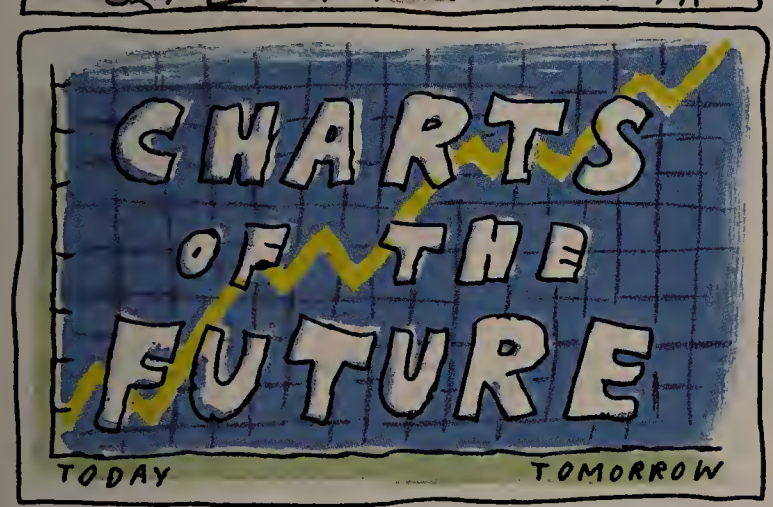

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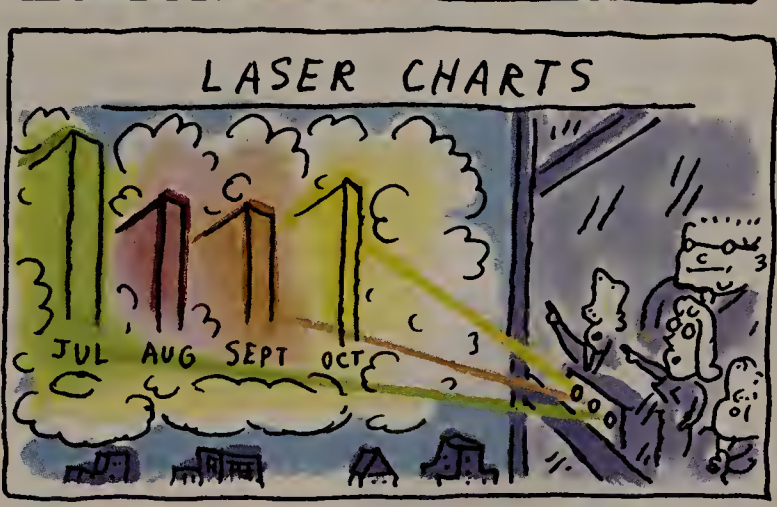

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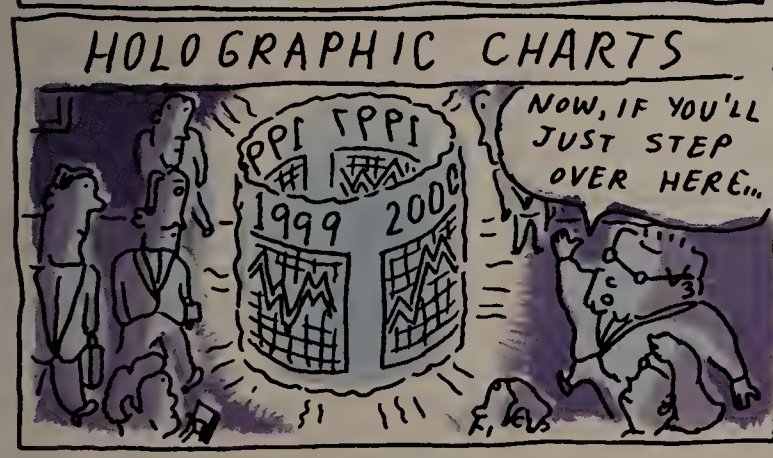

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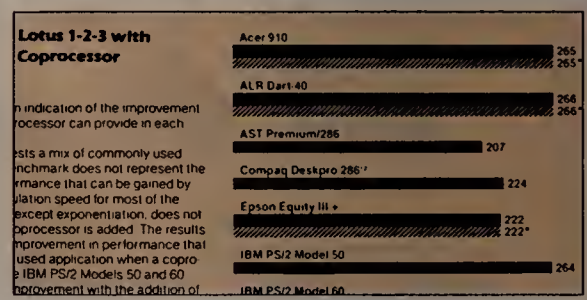

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Microprocessor	80286	80286	80386	8086	80286	80286	80286	80
Memory Cache	16K	8K	64K	8K	N	8K	8K	12
On-board memory	N	N	OP1	N	1024K	N	N	N
Computer processor retained	N	Y	N	N	Y	N	N	N
Change Speed	Y,S	Y,S	Y,S	Y,E	Y,S	Y,I	Y,I	Y,
Change speed without rebooting	Y,S	N	Y,S	Y,E	Y,S	N	N	Y
Change speed within application	N	Y,K	Y,K	N	N	N	N	N
Disk caching included	Y	Y	N	N	Y	N	N	Y
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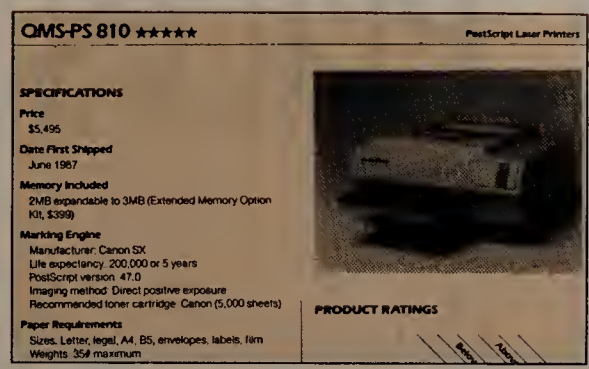

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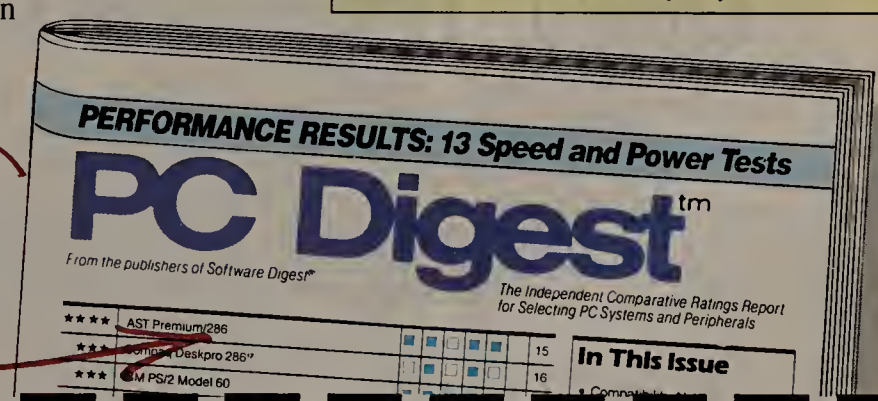

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Circle 33 on reader service card

IBM Fortifies Its Towers

Rebuilding its floor-standing PS/2 line, IBM also gets personal in the laser printer wars.

New PS/2s like this Model 65 SX pack up to 1.2GB of storage in the familiar Model 80 tower.

FRED STIMSON

Eric Bender

You can get state-of-the-art processors. You can get full expandability. But you still can't get both in a single PS/2.

IBM's new floor-standing systems start with an 80386SX-based model and climb to a 25-MHz 80386-based offering with 4MB of memory, a 64K cache, and a 320MB drive. All of these units are meant for a tower's traditional power-hungry applications—particularly network server roles.

Those roles require plenty of expansion capability, and that's available in spades. The PS/2s come in the familiar Model 80 box and offer seven Micro Channel slots (16-bit in the Model 65 SX, a mixture of 32/16-bit and 16-bit in the 386 models) and a 225-watt or better power supply. Each machine provides up to six storage bays and holds up to four SCSI drives. The standard IBM-built drives include 23ms 60MB and 120MB models, plus a 12.5ms 320MB version. With the latter, which IBM claims is the industry's fastest 3½-inch offering, you can boost internal storage to over 1.2GB.

More strikingly, all the machines come with a built-in SCSI bus master adapter, which supports up to seven SCSI devices while keeping the processing load off the central CPU. The adapter comes in two versions, both of which are also available for earlier PS/2s. The 32-bit board, with a 512K cache, achieves maximum throughput of 16.7MB per second and costs $995 when sold separately. The $495 16-bit offering transfers data at a maximum 8.3MB per second. Two dozen third-party SCSI device suppliers have announced support for IBM's adapters.

Still, in a world where you can buy 486 systems through the mail and where IBM has shown a 486-based network "super server" prototype since November, 25-MHz 386s seem a bit underpowered as top-end offerings—especially when rivals such as Compaq's Systempro bring such formidable horsepower to the high-stakes network competition. Moreover, the new PS/2s are

PC World previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.

SNAPSHOT

PS/2 Model 80 386, PS/2 Model 65 SX

IBM hos revomped its line of floor-stonding systems with models that emphosize expondobility ond connections to SCSI peripherols. The high end feotures o 25-MHz 386 processor.

KEY FEATURES

- **SCSI bus master adapter**
- **SCSI disks up to 12.5ms, 320MB**
- **Six storage bays**
- **Seven free slots**

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Reader service no. 700

The LaserPrinter E, an inexpensive addition to IBM's LaserJet-compatible line, brings 5-page-per-minute performance and upgrade options into the contest with Hewlett-Packard's LaserJet IIP.

FRED STIMSON

limited to 8MB of processor-speed memory on the system board.

IBM maintains, though, that in network service, the point is not so much CPU horsepower as the ability to exploit intelligent devices like the SCSI adapter on the Micro Channel bus. Rather than reinventing the minicomputer à la the Systempro, the theory goes, you simply add server resources (like disk drives) or more servers as the network expands. IBM's accompanying network software (OS/2 Extended Edition 1.2 and LAN Server 1.2, both now shipping) gives a significant part of the workload to the workstation, helping to ease server memory demands.

IBM's towers cost a bit more than the closest Compaq models, which don't offer as many slots and storage bays. The 16-MHz PS/2 Model 65 SX comes with the usual PS/2 paraphernalia and 2MB of memory and costs $5295 with a 60MB drive or $5995 with a 120MB drive. (For comparison, the Compaq Deskpro 386S with an 84MB drive lists for $4699.) The 20-MHz PS/2 Model 80 386 also comes with 2MB of memory and is priced at $7495 with a 120MB drive and $9895 with a 320MB drive. (The Deskpro 386/20E costs $6999 with 4MB of memory and a 110MB drive.) And the 25-MHz Model 80 386, with 4MB of memory, is priced at $10,695 with a 120MB drive and $13,195 with a 320MB drive. (A similar Deskpro 386/25E with a 120MB drive lists for $8499.) As these new machines debuted, IBM cut pricing on all earlier Model 80 and Model 60 offerings by 17 to 24 percent.

Taking a Page Printer From HP's Book

It's not over till it's over, even in the laser printer market. While HP seeks permanent worldwide dominance with products like the LaserJet IIP and III, IBM has come up with credible contenders and now enters the personal page-printer arena.

IBM's LaserPrinter E goes head-to-head against the LaserJet IIP, offering up to 5-page-per-minute performance (rather than the IIP's 4 ppm) at the same $1495 list price. Like the IIP, the LaserPrinter E takes PostScript cartridges. Unlike the IIP, the IBM unit can be enhanced to turn out up to 10 ppm.

The LaserPrinter E bears a strong family resemblance to IBM's more powerful LaserPrinter, which debuted last fall and now costs $2395 (same as the LaserJet III).

SNAPSHOT

LaserPrinter E

Sharing many features of IBM's LaserPrinter, the personal page-printer entry works at up to 5 ppm.

KEY FEATURES

- **Upgradable to become an Adobe PostScript printer for an additional $948**
- **Upgradable to 10 ppm**
- **Flexible paper-handling options**

AVAILABILITY

Now

PRICING

$1495

IBM

Reader service no. 701

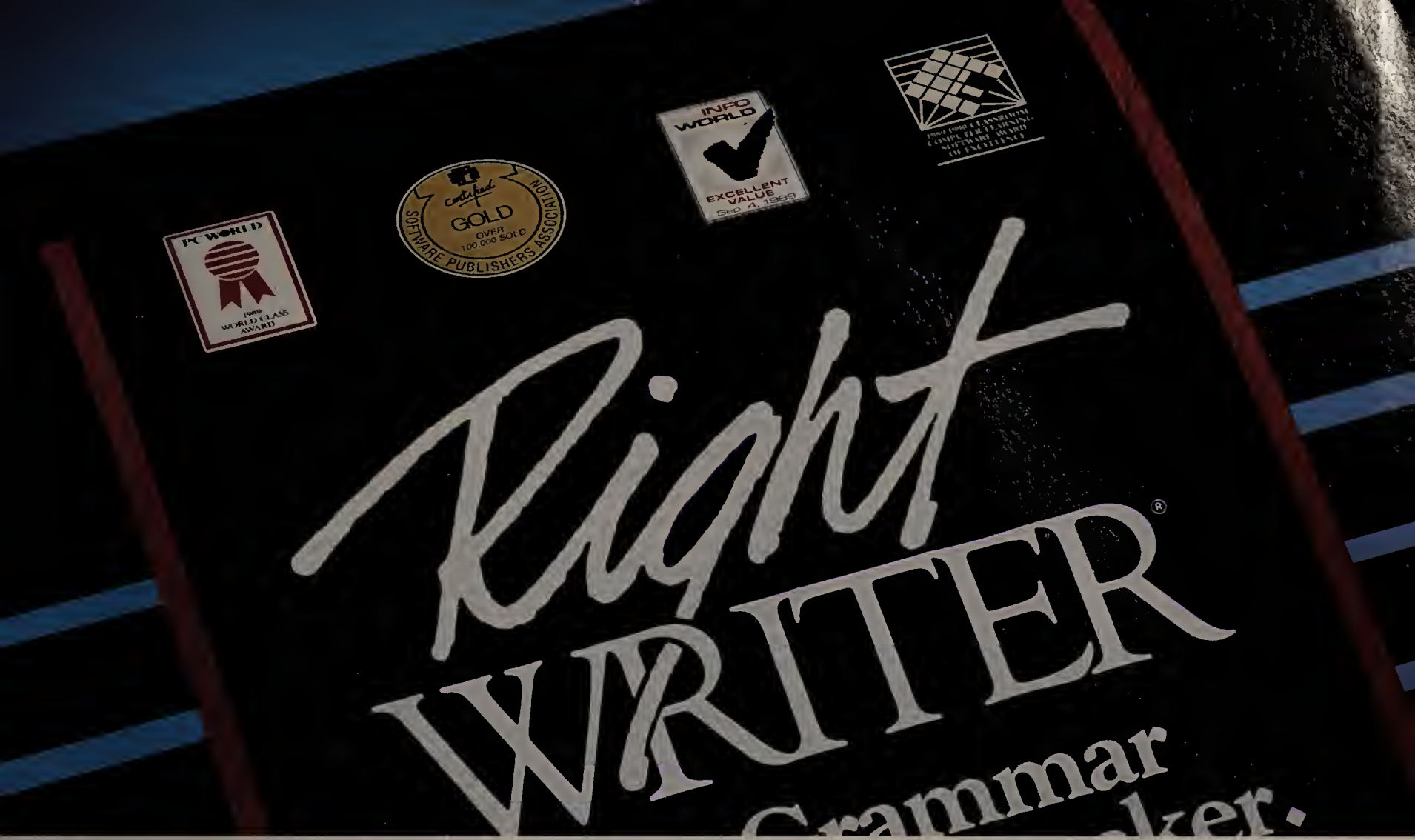
At 14 by 21 inches, the E is slightly larger than the IIP, but it actually takes up less space because pages emerge on top (in the IIP, they land in a tray that swings toward you). The E puts a full suite of status lights and controls right up front. It comes standard with 512K of memory and five Courier fonts in both portrait and landscape versions. The 300-dpi IBM-built print engine is rated at up to 12,000 pages per month.

The $199 print cartridge is good for up to 7000 pages (at 5 percent ink coverage) for a consumables cost of 2.8 cents a page, right in the IIP's ballpark. A built-in paper tray holds 200 sheets, compared to the IIP's 50. The E works with the standard LaserPrinter paper-handling accessories, which hold substantially more than HP's equivalents.

The E also takes LaserPrinter font cards, which pop into two slots on the front. Or you can combine a $499 Adobe PostScript option with a $449 1MB memory upgrade, which gives you 17 outline fonts for a total printer cost of $2443—a bargain-basement price for PostScript hardware. Additionally, an $899 premium PostScript enhancement gives you a total of 39 outline fonts; 2MB and 3.5MB memory upgrades cost $849 and $1599, respectively. In contrast, HP's $995 PostScript option includes 35 scalable faces and requires $795 for 2MB of memory, so you shell out $3285.

Here's something you won't find on the IIP: The IBM lets you upgrade to the full 10-ppm capability and 20,000 page-per-month duty cycle of the original LaserPrinter. Your dealer swaps in a $1099 board without modifying the print engine itself.

Eric Bender is PC World's *East Coast editor.*



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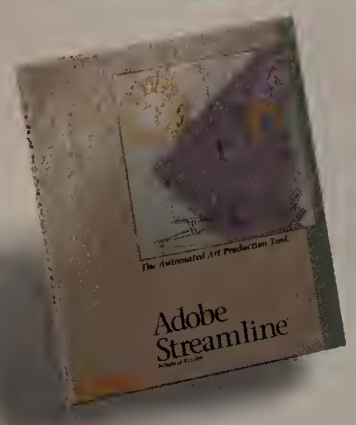

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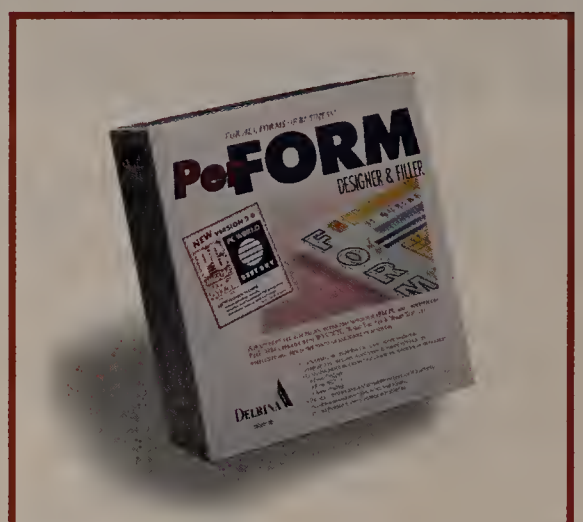

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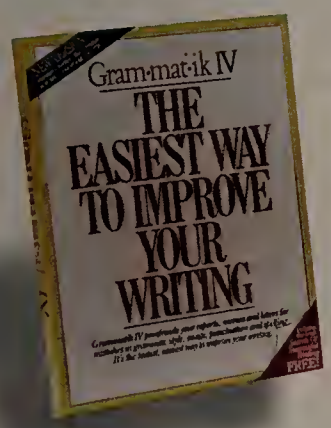

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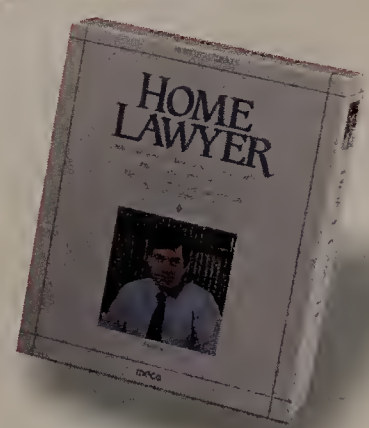

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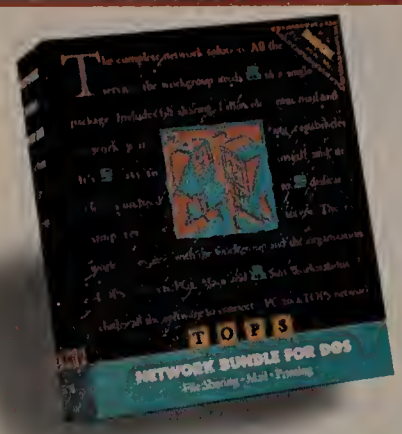

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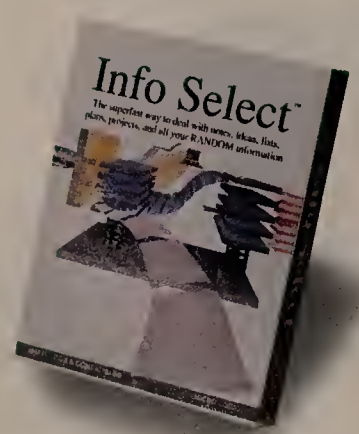

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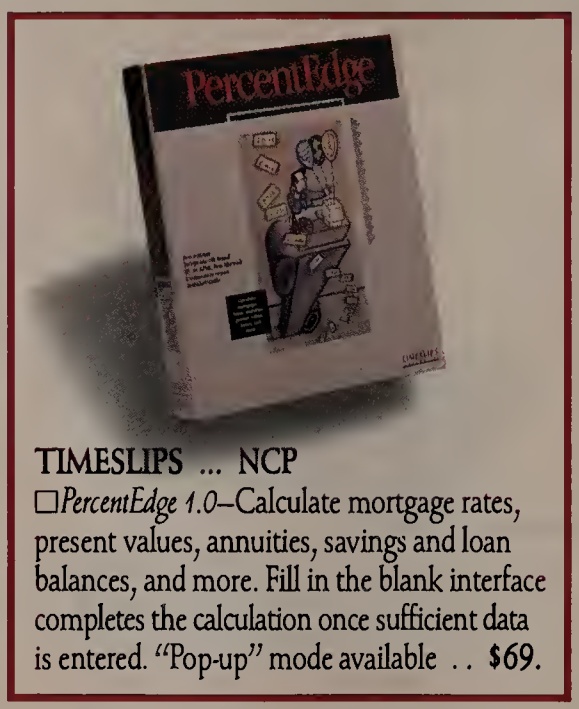
Sierra On-Line ... CP
6023 ▣Leisure Suit Larry III ..... 39.
6796 ▣Codename: Iceman ..... 39.
5106 ▣Space Quest III ..... 39.



TIMESLIPS ... NCP
☐*PercentEdge 1.0*–Calculate mortgage rates, present values, annuities, savings and loan balances, and more. Fill in the blank interface completes the calculation once sufficient data is entered. "Pop-up" mode available .. **$69.**

Spectrum Holobyte ... NCP
5993 ▣Welltris ..... 22.

Stone & Assoc. ... NCP
3435 ▣My Letters,Numbers,Words *(2 to 6)* 22.
3438 ▣Young Math *(ages 5 to 8)* ..... 22.
3439 ☐2nd Math *(ages 7 to 16)* ..... 27.

True BASIC, Inc. ... NCP
▣Kemeny/Kurtz Math Series:
10 titles ..... *each* 45.

HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.

American Power ... 2 years
6812 200DL *(stand-by power source)* .. 155.
6811 360SX *(stand-by power source)* ... 255.

AST Research ... 2 years
1299 SixPakPlus 384k C/S/P ..... 187.

Boca Research ... 5 years
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SuperVGA–(800 x 600) 16/8-bit ..... 135.
VGA–(640 x 480) 16/8-bit ..... 119.

6795 SixPak 286 512k ..... 209.
4107 RAMpage Plus 286 512k ..... 419.
4105 RAMpage Plus Micro Channel 512k 419.

Boca Research ... 5 years
7001 BOCARAM/AT PLUS *(0-8 Meg ext.)* 135.
7000 TophAT *(16-bit backfill 512K to 640K, with 0K)* ..... 79.
6998 I/O Board for AT ..... 59.
6999 I/O Board for Microchannel S/S/P . 109.

Brother International ... 1 year
5787 HL-8e Laser Printer ..... 1799.
5788 HL-8Ps PostScript Laser Printer . 2949.

Compucable ... 2 years
1604 2-Position switch box ..... 25.

Cuesta ... 1 year
1608 Datasaver 400 Watt *(power backup)* 429.

Curtis ... lifetime
1694 Emerald SP-2 ..... 36.
1707 Ruby SPF-2 *(6 outlets)* ..... 55.
1708 Ruby-Plus SPF-2 Plus ..... 65.

Datadesk ... 3 years
6901 Switchboard ..... 175.

Diconix ... 1 year
5655 150 Plus Printer *(Parallel)* ..... 359.

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1904 FX-1050 *(136 col., 264 cps, 9 pin)* .. call
5183 LQ-510 *(80 col., 180 cps, 24 pin)* ... call
1930 LQ-850 *(80 col., 264 cps, 24 pin)* .. call
6765 LQ-1010 *(136 col., 180 cps, 24 pin)* call
1917 LQ-1050 *(136 col., 264 cps, 24 pin)* call
4116 LQ-2550 *(136 col., 333 cps, 24 pin)* call
5184 LX-810 *(80 col., 180 cps, 9 pin)* .... call
1052 Printer-to-IBM cable *(6 feet)* ..... 15.

5th Generation ... 1 year
3952 Logical Connection 512k ..... 449.

Hayes ... 2 years
2307 Smartmodem 2400 ..... 349.
2308 Smartmodem 2400B *(w/Smartcom II)* 279.

Hercules ... 2 years
2318 Graphics Card Plus ..... 189.

Hewlett-Packard ... 1 year
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6581 DeskJet Plus *(w/ink cartridge)* .... 719.
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6421 2400B MNP Internal Modem .... 199.
2352 2400B Internal Modem 2 *(for PS/2)* 249.
5119 2400 Baud External Modem ..... 179.
6420 2400EX MNP Modem. ..... 229.
2346 Inboard 386/PC w/1 Meg *(w/free Ami)* 519.
4266 Above Board Plus 512k ..... 419.
4267 Above Board Plus I/O 512k ..... 449.
5336 Above Board Plus 8 2 Meg ..... 599.
5342 Above Board Plus 8 I/O 2 Meg ... 629.
4272 Above Board 2 Plus 512k ..... 469.
5396 Above Board MC 32 0k ..... 359.
4275 Connection CoProcessor *(w/Fax-it)*. 529.
4857 Visual Edge ..... 449.
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2369 80287-10 *(for PS/2 Models 50 & 60)* 229.
4750 80387SX *(for 80386SX CPU's)*.... 309.
2371 80387 *(for 16 MHz 80386 CPU's)*.. 349.
2372 80387-20 *(for 20 MHz 80386 CPU's)*399.
Kensington Microware ... 1 year
2587 Master Piece Plus Remote ..... 89.
2582 Master Piece Plus ..... 109.
5697 Expert Mouse *(Trackball for PS/2)* . 115.
Key tronic ... 3 years
4518 101 Plus Keyboard ..... 99.
Kraft ... 5 years
5801 New Game Adapter *(2 game ports)*. 27.
5800 3 button Thunder Joystick..... 29.
5802 Trackball..... 69.
Logitech ... limited lifetime
5464 Series 2 Mouse *(C9 for PS/2's)* .... 69.
5151 HiREZ Mouse *(C9)* ..... 85.
6029 Trackman *(Trackball) serial* 85. *bus* 89.
4297 ScanMan Plus *(hand scanner)* ... 185.
6786 ScanMan w/Catchword 1.0..... 315.
Micron Technology ... 2 years
6669 Intensify 2 Meg Expansion for HP LaserJet II *(upgradeable to 4 Meg)*. 329.
6013 Beyond Mem. Brd. for Model 50 *(512k)* 359.
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2898 Mouse with Windows 286 2.1 ... $139.
MicroSpeed ... 1 year
6007 PC-TRAC Trackball *serial* 75. *bus* 85.
6010 FastTRAP 3D Trackball *serial* 99. *bus* 109.
Mouse Systems ... lifetime
5997 Trackball *(1 yr. wrnty.) serial* 75. *bus* 85.
4306 PC Mouse II w/PC Paint+ ..... 89.
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6208 Multisync 4D Monitor..... 1199.
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4690 ProDesigner VGA *(800 x 600)* .... 249.
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3200 Silencer 150 *(84% noise reduction)* 115.
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6779 25 Cartridges in One! *(for LJ II, IIP, IID)* .275.
6840 Memory upgrade for LaserJet 2P/III *1 Meg* ..... 179. *2 Meg* ..... 249.
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Intel ... 5 years
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3103 2400 Baud Internal Modem ..... 135.
3102 2400 Baud External Modem ..... 179.
5286 2400 Baud Int. MNP Modem *(Lev. 5)* 175.
5285 2400 Baud Ext. MNP Modem *(Lev. 5)* 209.
4542 2400 Baud Internal Modem for PS/2 . 229.
Safe Power Systems ... 2 years
4562 Safe 425W *(standby power bkup)* 329.
6747 Safe 400S..... 409.
SOTA Technology ... 2 years
5111 SOTA 286i-12 *(12 MHz accelerator)* 269.

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4899 Nylon Laptop carrying case ..... 55.
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6037 Premier leather carrying case .... 199.
TheComplete PC ... 2 years
5598 TheComplete Half Pg. Scanner 400 189.
5140 TheComplete Page Scanner..... 549.
5828 TheComplete Communicator ..... 559.
6797 TheComplete Fax Portable ..... 319.
Toshiba ... 1 year
6432 T1000SE Notebook Laptop *(5.9 lbs.)* .. call
4958 T1600 Laptop *(12 MHz, 20 Meg)* . 3249.
Tripp Lite ... 2 years
6199 Isobar 4-6 *(4 outlets, 6 ft. cord)* .... 49.
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6019 LS 600 Line Stabilizer ..... 85.
Video 7 ... 7 years
5883 1024i VGA *(includes 512k)* ..... 289.
4931 VRAM VGA 512k ..... 399.

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2917 40-60 Meg Internal Tape Drive. . . . 379.
5502 83-152M Ext. Tape Drive . . . . . 799.
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5190 DC2000 Pre-formatted Cartridges ea. 35.

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5010 1.2 Meg External *(for PS/2's)* . . . . . 215.
6602 1.44 External *(for PC/XT/AT)* . . . . . 239.

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Seagate ... 1 year

FREE PCTV® Hard Drive Installation Tape with purchase of 20, 30 or 40 Meg Seagate drive for the IBM PC (not for AT). Beta or VHS.

2285 20 Meg Internal Hard Drive ST225 *(w/controller and cables, 65 ms)* . . 275.

Datadesk ... 3 years
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4554 40 Meg Int. HD ST251-1 (28 ms) . . 359.
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4951 720k Drive *(specify XT or AT, 3½")* . 79.
4670 1.44 Meg Drive for XT *(3½")*. . . . . 99.
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MISCELLANEOUS

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6360 CheckFree . . . . . 25.

CompuServe

1676 CompuServe Information Service . . 24.

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5511 Right Angle Printer cable *(6 feet)* . . . 15.
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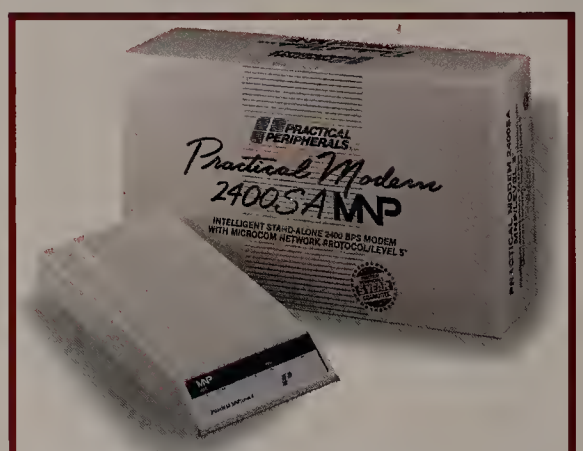

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6712 QD 600A Tape Cartridge . . . . . 27.
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Hawaii:

- For monitors, printers, Bernoulli Boxes, computers, hard drives, and power backups, actual UPS Blue charge will be added. For all other items, add $3 per order.

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- Call 603/446-7721 for information.

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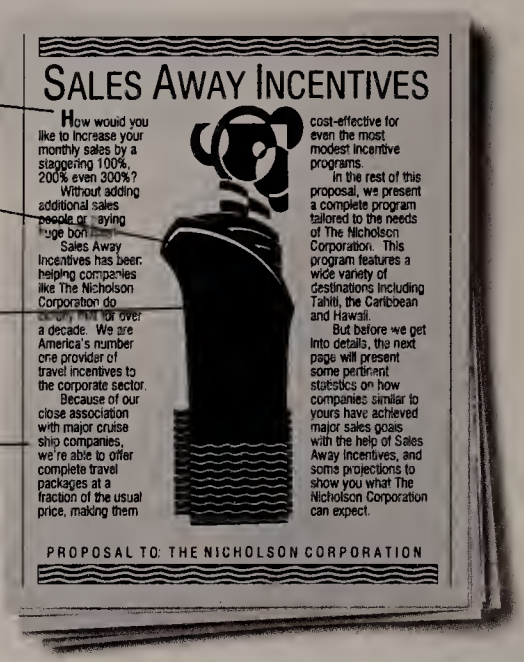


SALES AWAY INCENTIVES

How would you like to increase your monthly sales by a staggering 100%, 200% even 300%?

Without adding additional sales people or paying huge bonuses!

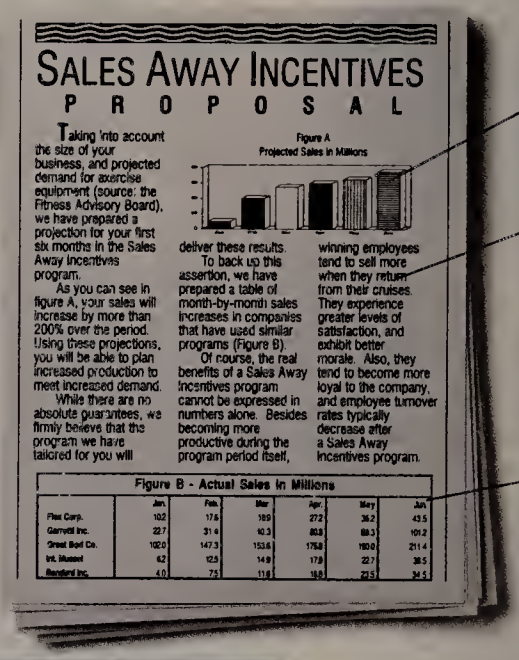
Sales Away Incentives has been helping companies like The Nicholson Corporation do [illegible] for over a decade. We are America's number one provider of travel incentives to the corporate sector.

Because of our close association with major cruise ship companies, we're able to offer complete travel packages at a fraction of the usual price, making them cost-effective for even the most modest incentive programs.

In the rest of this proposal, we present a complete program tailored to the needs of The Nicholson Corporation. This program features a wide variety of destinations including Tahiti, the Caribbean and Hawaii.

But before we get into details, the next page will present some pertinent statistics on how companies similar to yours have achieved major sales goals with the help of Sales Away Incentives, and some projections to show you what The Nicholson Corporation can expect.

PROPOSAL TO: THE NICHOLSON CORPORATION



SALES AWAY INCENTIVES
PROPOSAL

Taking into account the size of your business, and projected demand for exercise equipment (source: the Fitness Advisory Board), we have prepared a projection for your first six months in the Sales Away Incentives program.

As you can see in figure A, your sales will increase by more than 200% over the period. Using these projections, you will be able to plan increased production to meet increased demand.

While there are no absolute guarantees, we firmly believe that the program we have tailored for you will deliver these results.

To back up this assertion, we have prepared a table of month-by-month sales increases in companies that have used similar programs (Figure B).

Of course, the real benefits of a Sales Away Incentives program cannot be expressed in numbers alone. Besides becoming more productive during the program period itself, winning employees tend to sell more when they return from their cruises. They experience greater levels of satisfaction, and exhibit better morale. Also, they tend to become more loyal to the company, and employee turnover rates typically decrease after a Sales Away Incentives program.

Figure A
Projected Sales in Millions

Figure B - Actual Sales in Millions

	Jan.	Feb.	Mar	Apr.	May	Jun.
Flex Corp.	102	176	189	272	362	43.5
Garnett Inc.	22.7	31.4	40.3	80.8	88.3	101.2
Great Bod Co.	102.0	147.3	153.6	175.8	180.0	211.4
Int. Muscel	6.2	12.5	14.9	17.9	22.7	38.5
Rangford Inc.	4.0	7.5	11.8	18.8	23.5	34.5

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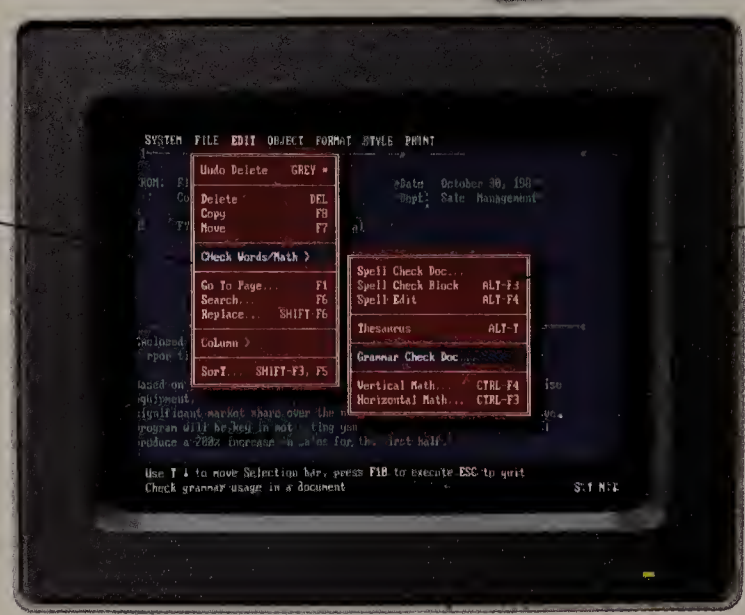

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33-MHz 486s? Now You're Talking

Looking for the real cutting edge? AST and Everex can take you to the next stage in 486 performance.

AST's Premium boxes look alike, but inside the 486/33 ISA beats the heart of one of the fastest PCs alive.

Eric Knorr

No bones about it, we're disappointed in the performance of 25-MHz 486 systems (see "The First 486s: Great Expectations Unfulfilled" in this issue). Surprisingly, those we've reviewed seem to do little better—and in some benchmarks, worse—than cheaper 33-MHz 386 systems.

But two 486 systems are about to establish the next level of PC performance: the AST Premium 486/33 ISA and the Everex Step 486/33. Preliminary benchmark results suggest that these 33-MHz machines will catapult 486 processing speed to where it should be—over half again as fast as the speediest 386.

Both the Premium 486/33 ISA and the Step 486/33 offer standard AT-style buses; no fancy EISA or Micro Channel footwork here. With a standard bus, you may miss additional throughput in very heavy multiuser applications, and you can forget about automatic board setup, but you'll also pay less. The base models from AST and Everex each come in around $10,000.

Unfortunately, you can't rush out to buy either of these machines. Both should be shipping by the time you read this, but not in large quantities. Word on the street is that Intel's 33-MHz 486 production may not be in full swing until this fall—or later, if delays in the 25-MHz 486 schedule are any indication.

AST's Ultimate Upgrade

Every model in AST's Premium line features a removable brain, and the 486/33 ISA is no exception. A special 32-bit expansion board holds the 33-MHz 486 CPU, a Weitek 4167 coprocessor socket (for CAD applications), and a standard 4MB of RAM. You can start with the bottom of the line, the Premium 386SX/16, and upgrade to the current screamer simply by swapping cards.

Other than their CPU boards and nameplates, all members of the Premium family are identical. One of their most impressive features is the 36MB capacity for CPU-speed RAM. To upgrade to full capacity, you need to fill the two remaining 32-bit slots with fully populated memory boards from AST.

The Premium series features an AT-sized chassis with bays for five half-height (or one half-height and two full-height) drives—enough to fill a work group's mass storage needs. You get one 8-bit slot and three 8/16-bit slots; any 32-bit slot unoccupied by a memory or CPU board can also act as an 8/16-bit slot. One parallel and two serial ports are built into all Premium motherboards, as are the floppy controller and hard disk interface. This high level of integration leaves from three to five slots free, depending on the configuration.

The base model Premium 486/33 ISA, with 4MB of RAM, a 1.2MB floppy drive, and a 101-key keyboard, costs $9995. The next model up adds a 110MB hard disk and goes for $11,495; the 320MB version costs $13,645.

Everex Steps Out

Ever since the first Step 386 model came out, Everex has made a point of creating machines that perform at or near the top of the class. The Step 486/33 is unlikely to be an exception.

The Step's ace in the hole is its 128K secondary memory cache. The 486 chip already contains a fast 8K memory cache that holds often-used data; about 80 percent of the time this keeps the processor from wasting time accessing slower main memory. When the 486 doesn't find what it needs in the 8K, it uses a super-fast burst mode to grab data from the Step's equally fast secondary cache.

The Step 486/33's interleaved caching scheme is similar to that of ALR's PowerCache 4 (see "ALR's TrueBlue 486," October 1989). The more main memory you add, the better the system should perform relative to units without secondary caches. In memory capacity, the Step 486/33 is no laggard: It comes standard with 4MB of RAM and can address up to 64MB of CPU-speed memory.

The Step 486/33's drive capacity is identical to that of the Premium 486/33 ISA, but the slot count is a bit better—all configurations leave you five slots free. Without a hard drive, the Step 486/33 costs $10,500. A 160MB ESDI drive is priced at $1599, a 330MB drive at $2399.

SNAPSHOT

AST Premium 486/33 ISA

AST's offers 33-MHz 486 processing either in a system or in an upgrade to any member of the Premium line.

KEY FEATURES

- **36MB capacity for CPU-speed RAM**
- **Space for five half-height drives**

AVAILABILITY

Second half 1990

PRICING

$9995; $11,495 with 110MB drive, $13,645 with 320MB drive

AST Research Inc.
16215 Alton Pkwy.
Irvine, CA 92718-9658
714/727-4141,
714/727-9363

Reader service no. 705

The Everex Step 486/33's special memory architecture should help it lead the pack in processing speed.

Everex has included a utility to help handle a sticky software compatibility problem. Several 386-specific programs, including *Paradox/386* and *Foxbase+/386*, tap Virtual Control Program Interface techniques to break the 640K barrier so that they can move data from disk into extended memory. Such applications are ideal for exploiting high-speed 486 processing. Trouble is, this method inadvertently shuts off the 486's 8K internal cache, sending performance plummeting. The Step 486/33 utility enables you to turn the cache back on.

The Wait Is On

New versions of DOS extended-memory programs will solve the cache shutdown problem. And more 386-specific software that exploits the large RAM capacities of systems like the Premium 486/33 ISA and the Step 486/33 is exactly what's needed to take the fullest advantage of the speedy 486 chip.

The real bottlenecks in most applications are hard disk speed and disk controller speed. Let's hope that by the time these new systems ship in quantity, we'll have more applications that put plenty of data in fast RAM instead of on disk, letting these systems really strut their stuff.

Eric Knorr is a senior editor for PC World.

SNAPSHOT

Everex Step 486/33

Everex threw everything but an EISA bus into the quest for 486-based power.

KEY FEATURES

- **128K secondary memory cache**
- **64MB capacity for CPU-speed RAM**

AVAILABILITY

Second half 1990

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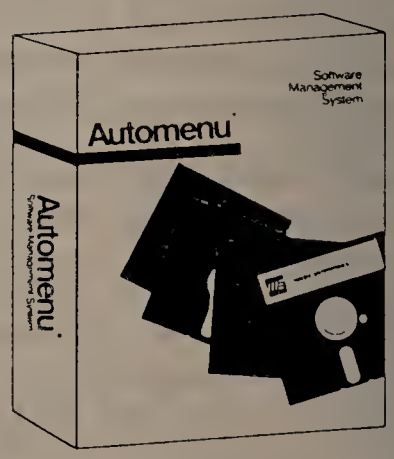

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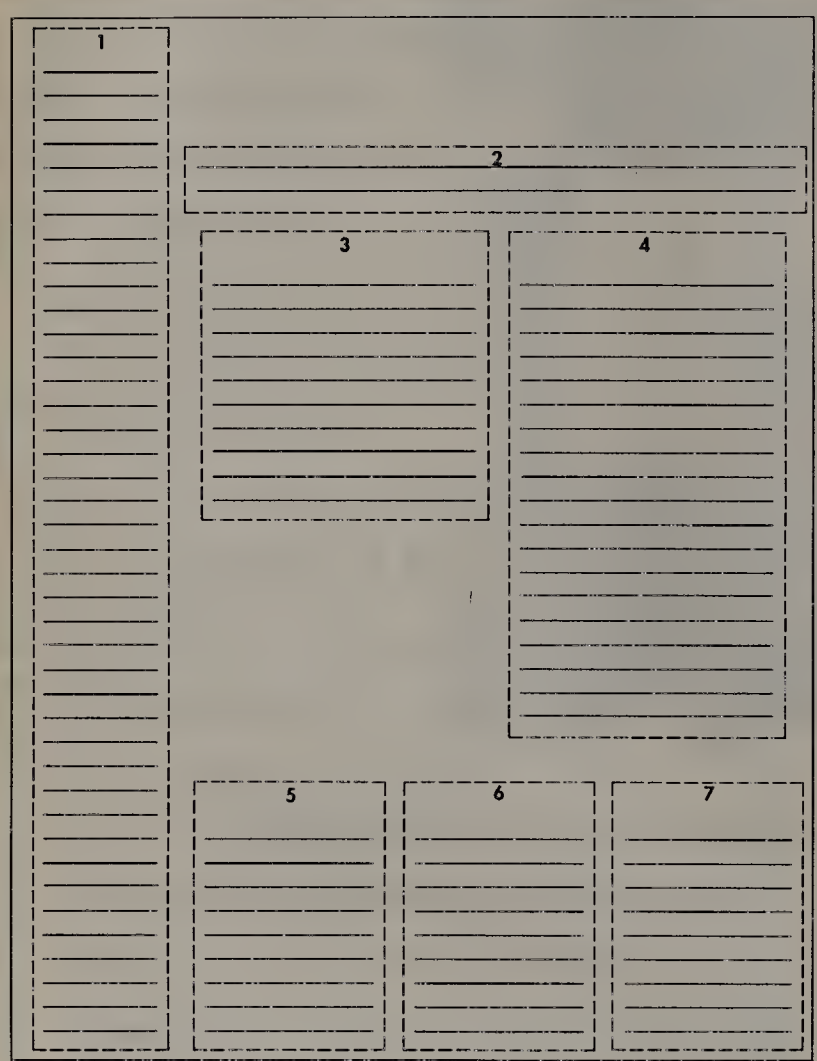

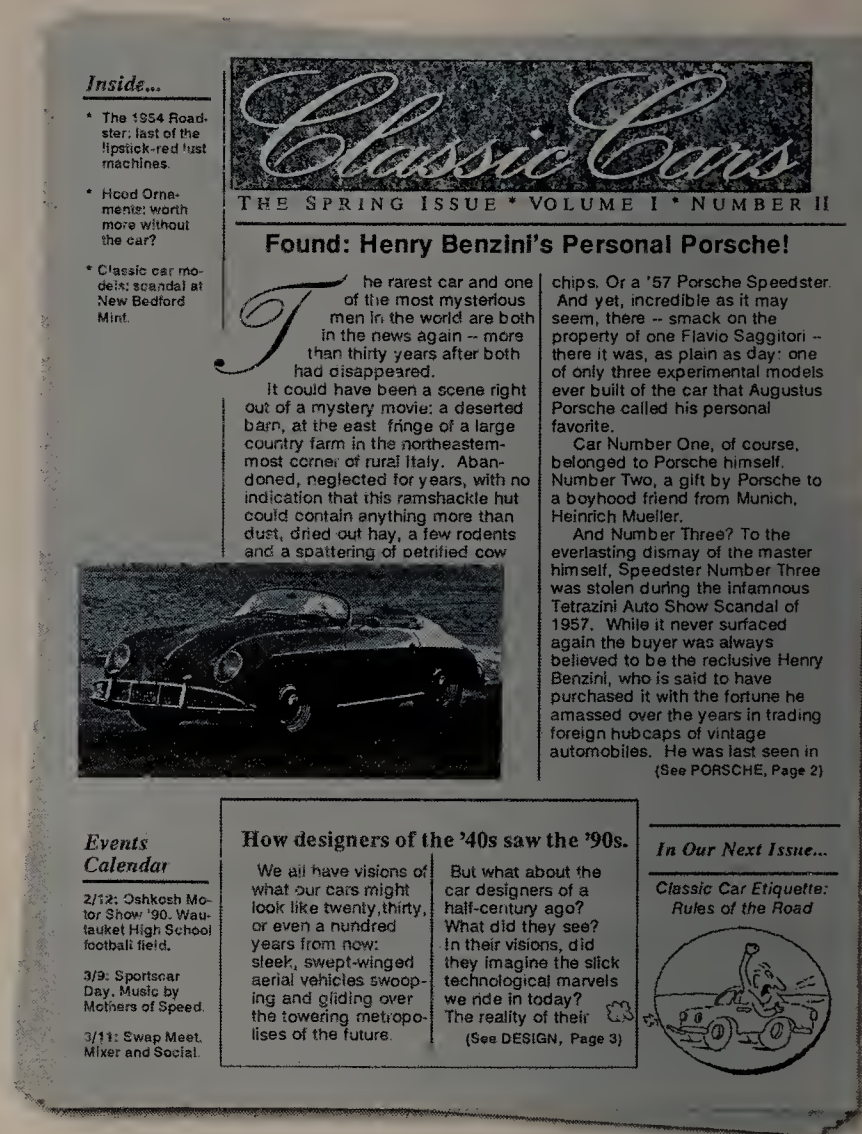

Inside...

- The 1954 Roadster: last of the lipstick-red lust machines.
- Hood Ornaments: worth more without the car?
- Classic car models: scandal at New Bedford Mint.

Classic Cars

THE SPRING ISSUE * VOLUME I * NUMBER II

Found: Henry Benzini's Personal Porsche!

The rarest car and one of the most mysterious men in the world are both in the news again -- more than thirty years after both had disappeared.

It could have been a scene right out of a mystery movie: a deserted barn, at the east fringe of a large country farm in the northeastern-most corner of rural Italy. Abandoned, neglected for years, with no indication that this ramshackle hut could contain anything more than dust, dried out hay, a few rodents and a spattering of petrified cow chips. Or a '57 Porsche Speedster.

And yet, incredible as it may seem, there -- smack on the property of one Flavio Saggitori -- there it was, as plain as day: one of only three experimental models ever built of the car that Augustus Porsche called his personal favorite.

Car Number One, of course, belonged to Porsche himself. Number Two, a gift by Porsche to a boyhood friend from Munich, Heinrich Mueller.

And Number Three? To the everlasting dismay of the master himself, Speedster Number Three was stolen during the infamnous Tetrazini Auto Show Scandal of 1957. While it never surfaced again the buyer was always believed to be the reclusive Henry Benzini, who is said to have purchased it with the fortune he amassed over the years in trading foreign hubcaps of vintage automobiles. He was last seen in

(See PORSCHE, Page 2)

Events Calendar

2/12: Oshkosh Motor Show '90. Wautauket High School football field.

3/9: Sportscar Day. Music by Mothers of Speed.

3/11: Swap Meet, Mixer and Social.

How designers of the '40s saw the '90s.

We all have visions of what our cars might look like twenty, thirty, or even a hundred years from now: sleek, swept-winged aerial vehicles swooping and gliding over the towering metropolises of the future.

But what about the car designers of a half-century ago? What did they see? In their visions, did they imagine the slick technological marvels we ride in today? The reality of their

(See DESIGN, Page 3)

In Our Next Issue...

Classic Car Etiquette: Rules of the Road

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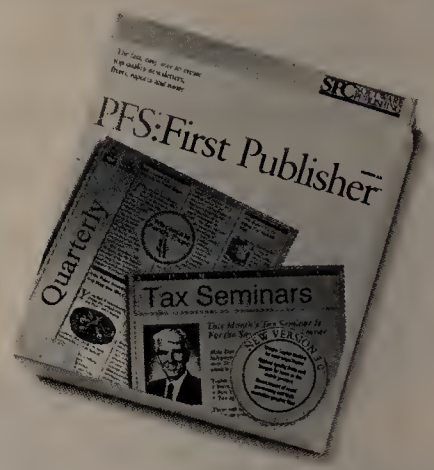

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Circle 246 on reader service card

PRODUCT OUTLOOK

Edited by MIKE HOGAN

INSIDE PRODUCT OUTLOOK

107 **NEC Silentwriter2 260 and 290** NEC's new laser printers aren't really silent, but they are versatile.

108 **Arche Pro-File 486 Server and Legacy 486, Blackship 486/25, Club American Hawk II** Four ways to put 486 speed and power on your desktop—without breaking the bank.

108 **The Complete Fax/Portable** Turn your laptop into a portable fax machine with a 9600-bps Group III fax in a hip-pocket–sized box.

110 **Lanstation I** Eliminate network security headaches with a diskless workstation from Emerald.

110 **Splitword J-16** This VGA controller lets you zoom in on a detail or view three screens simultaneously.

112 **Coretape Light** Core's tape backup system gives you easy, speedy access to backed-up data.

112 **PrintCache** A print spooler with smarts, PrintCache lets even low-end LaserJets handle big files fast.

112 **StorMor** Faster than a tape backup, cheaper than a hard drive—Q/COR's floppy drive holds 20MB+.

114 **Expense It** Track expenses or create invoices on the road with this package.

114 **HotShot Presents** Pull together simple on-screen presentations that you can easily turn into handouts, slides, or overheads.

114 **LZR 650** Dataproducts' low-cost personal laser has enough power for a small work group.

116 **ITC 386 CEL** A truly portable portable PC: This 386SX lets you make voice calls and exchange files with its built-in cellular phone.

UPDATE

116 **Magellan 2.0** Lotus's DOS shell adds backup capabilities and gives you direct access to *PKZIP*.

118 **FormWorx System 2** With this *Windows*-based designer, you can create or customize forms and link them to a data base.

118 **PC Tools Deluxe 6.0** Ready-to-use DOS, a bundled version of *Lap-Link*, and smarter backup highlight a heavyweight upgrade.

118 **Time Line 4.0** LAN support and a graphical user interface enhance Symantec's project manager.

120 **PC-Trac** Microspeed's redesigned trackball is fast, precise, and comfortable.

120 **Professional Accounting Series 2.0** An old hand at small-business accounting links its modules and adds a report generator.

120 **Fontware 3.0 Starter Kit for Windows** Now *Windows* applications can share soft fonts with *WordPerfect* and *PageMaker* files.

NEC Silentwriter2 260 and 290

Easy-to-Own Lasers for the Nineties

NEC's Silentwriter2 260 is a feature-rich alternative to the Hewlett-Packard LaserJet Series II, while model 290 offers Adobe PostScript boosted by a fast graphics-building controller for $3995.

If you loved NEC's boxy LC 800 laser line, you can reserve a place in your heart for the new Silentwriter2 260 and 290 laser printers. Besides being smaller and more stylish than their predecessors, these machines have been updated for more flexibility and fewer upkeep hassles.

Just 25 by 17 by 11 inches and under 50 pounds, the 8-ppm, 300-dpi Silentwriters offer hushed, if not exactly silent, operation at 50 decibels. And you'll spend less time under the hood with the 260 and 290, thanks to their consumables' longer life. NEC has increased output between fill-ups from 3000 copies to 4000 and combined the developer and toner cartridges, for a fairly standard consumables cost of 3.1 cents per page.

The $2695 Silentwriter2 260 is an HP LaserJet Series II compatible with eight fonts built-in and more available through $200 proprietary ROM cards that fit in either of two external slots. It has 1MB of memory but accepts up to 5MB. The interface detector automatically switches to receive from either a parallel or a serial port.

For $3995, the 290 offers PostScript compatibility via a built-in Adobe interpreter that gives you 35 resident scalable fonts. The 290 also emulates the HP LaserJet Plus, so you can print your existing application files without upgrading. A 17-MHz processor, compared with 10 MHz in the 800 series, makes intensive PostScript graphics and fonts work a lot faster. Silentwriter2 290 has 2MB of memory expandable to 4MB. A 200-sheet letter cassette is standard; an optional 200-sheet legal-sized cassette is $79; and a 200-capacity envelope feeder costs $89. NEC Technologies Inc., 1414 Massachusetts Ave., Boxborough, MA 01719; 508/264-8000. —*Mark Henricks*

Reader service no. 633

Arche Pro-File 486 Server and Legacy 486, Blackship 486/25, Club American Hawk II

Small Companies, Low Prices Ride the Second 486 Wave

Low-priced 486s have arrived, matching the cached speed of the 25-MHz chip with enough storage and expandability to do duty as either graphics workstations or file servers.

A new class of PC usually debuts under the label of big companies that charge big-ticket prices. But knowledgeable PC buyers often wait for small companies to bring out functionally equivalent machines for much less dough.

With 486 systems, it was a short wait. Arche Technologies, Blackship Computer, and Club American Technologies are all shipping reasonably priced 486 systems. While Blackship assembles and packages third-party technology, Arche and Club American build their own motherboards. Arche offers bona fide cutting-edge technology—including proprietary, application-specific integrated circuits (ASICs) that reduce the component count and boost reliability.

Arche offers two 486 systems: The Pro-File 486 Server is a tower system, while the Legacy 486 Workstation is an AT-sized desktop. In a standard configuration with 4MB of RAM, an 80MB hard disk, and VGA graphics, the units cost $11,110 and $10,810, respectively. They use the same motherboard, which sports a second cache to supplement the 486 chip's 8K internal cache.

About half the 486 systems released so far incorporate these secondary caches, which are intended to further speed memory access. The Arche models' 256K memory cache is designed to sustain high throughput even when simultaneous requests come fast and furious from multiple applications. To back up this technological machismo, Arche offers an unusual two-year warranty on parts and labor at no extra charge.

Club American's Hawk II also lays claim to proprietary technology, with a secondary cache that you can upgrade from a base of 64K to 256K. For some buyers, however, the real attraction will be the price. Configured like the Arche machines, this unit goes for an amazingly humble $4995.

The Blackship 486/25 also plays in lowball territory. It includes a motherboard from Micronics with an interleaved 128K secondary cache that boasts special talents when the 486's cache runs out of steam. The price? A mere $5445 in the same configuration as its two rivals. —*Eric Knorr*

Pro-File 486 Server and Legacy 486 Workstation, Arche Technologies, 48881 Kato Rd., Fremont, CA 94539; 800/422-4674, 415/623-8100, 415/683-6754 (fax).

Reader service no. 630

Blackship 486/25, Blackship Computer Systems, 4031 Clipper Ct., Fremont, CA 94538; 800/877-6249, 415/770-9300, 415/770-8674 (fax).

Reader service no. 631

Hawk II, Club American Technologies, 3401 W. Warren Ave., Fremont, CA 94539; 415/490-2201, 415/490-2687 (fax).

Reader service no. 632

The Complete Fax/Portable

Hit the Road, Fax

These days, timely business communication means facing the fax, but a fax machine can be hard to find when you're on the road. The $499 Complete Fax/Portable solves that problem by letting you turn your laptop into a traveling fax machine.

The Complete PC has squeezed a 9600-bps Group III fax board into a box small enough to slip into your hip pocket. Just connect the 5¾-by-3-by-1-inch unit to your PC's serial port and plug it into a phone jack. A pop-up window makes it easy to send faxes from inside applications, although you won't be able to send or receive faxes in the background as you can with the company's Fax/9600 board.

Send files to any Group III fax while on the road with the pocket-sized Complete Fax/Portable, which handles both standard (98-by-204-dpi) and high-resolution (196-by-204-dpi) transmissions.

The Fax/Portable handles both standard (98-by-204-dpi) and high-resolution (196-by-204-dpi) fax formats. You can broadcast messages to lists of recipients, schedule transmissions, and convert faxes to and from a variety of file formats—including PCX, CUT, and Microsoft Paint—but not into a TIFF image or an editable text file.

The Complete Fax/Portable, which comes with an RS-232 cable and both 9-pin and 25-pin connectors, requires 512K, DOS 3.11 or a later version, a serial port, and a hard disk. The Complete PC, 1983 Concourse Dr., San Jose, CA 95131; 800/634-5558, 408/434-0145. —*Daniel Tynan*

Reader service no. 635

Even This Is More Confining Than Clipper.

Just as the vast expanse of the American West gave its settlers a new perspective on opportunity, Clipper's open architecture lends unprecedented freedom to application development.

Unlike fixed systems, Clipper never forces you to "make do". Its language is fully extensible with user-defined functions and new user-defined commands. You can extend the language with routines written in Clipper itself, or integrate code from other languages like C, Assembler, dBASE® and Pascal. Odds are, you already have knowledge you can use with Clipper!

But if a customizable language isn't enough, there's even more elbow room. Database and I/O drivers can be supplemented or replaced. Even Clipper's linker knocks down barriers by allowing you to develop applications larger than available memory, without defining overlays! And when you're done, Clipper's compiler generates stand-alone, executable files for cost-free, unrestricted distribution.

So, don't let the bounds of fixed systems fence you in. Unleash your imagination in the wide-open spaces of Clipper. To find out more, give us a call today.

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Lanstation I

Diskless Designs Mean Secure Nets

On a networked PC, a local disk drive can be more trouble than it's worth. The diskless Lanstation I from Emerald saves space, improves network data security, and eases the network administrator's management tasks using an unorthodox design that will draw stares.

Atop the Lanstation's 5¾-by-14¾-inch black aluminum case—barely larger than most keyboards—sits a 9-inch electroluminescent screen with a tilt-and-swivel mount. The flat-panel orange display has an EGA-quality resolution of 640 by 350.

Emerald has packed a 286 computer, including video controller, on a motherboard the size of a standard 16-bit add-on board. Most components are reliable, power-saving, low-heat CMOS designs. You can pack up to 4MB onto the motherboard using easy-to-install 1-megabit single in-line memory modules (SIMMs). The 12.5-MHz system also includes a single 16-bit slot to accommodate an Ethernet, Arcnet, or Token-Ring network adapter card.

A thin slot in the front of the cabinet allows you to load software from credit-card-sized ROM chips if you use a network operating system, like Banyan VINES, that permits it. Two serial ports and one parallel port are also standard.

Since there's no floppy drive, your LAN administrator won't have to worry about the entrance of nonstandard software or the departure of critical data from the network. If you don't even want to have your data on the server, you can equip your Lanstation I with its own 2½-inch, 20MB, 18ms internal hard disk. The fixed disk fits in a special slot, so it doesn't take up the single standard expansion slot. A drawback: It's not user installable.

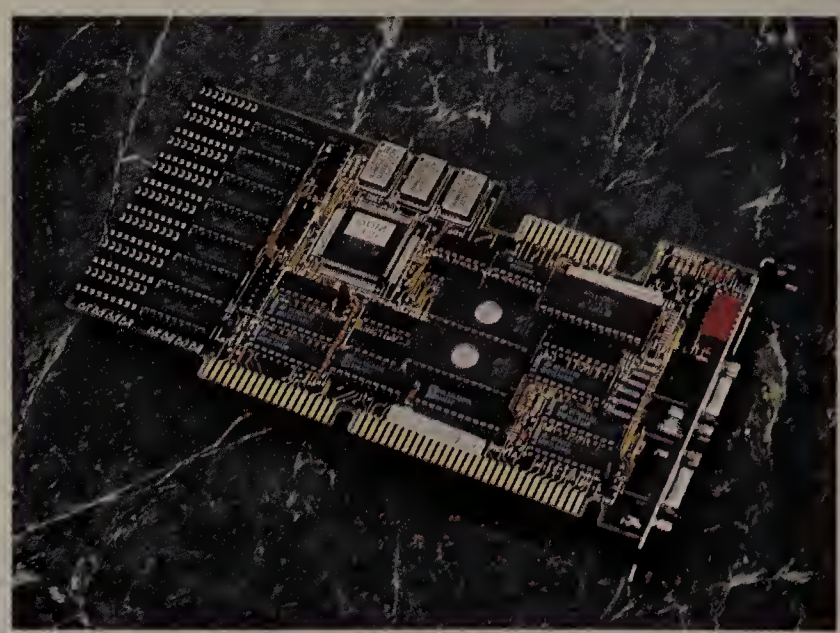
Emerald offers a one-year guarantee of repair or replacement within 48 hours. With 1MB of memory, Lanstation I is $1895. The 20MB hard drive adds $500. Emerald Computers, 7324 S.W. Durham Rd., Portland, OR 97224; 800/321-5711, 503/620-6094. —*Mark Henricks*

Reader service no. 634

Emerald's sleek Lanstation I, with a built-in electroluminescent display and a 20MB hard disk option (but no floppy), offers LAN data security.

Splitword J-16

VGA With Zoom Gives You a Close-Up Look at Screens



The Splitword J-16 video card lets you zoom in on a spreadsheet range, then zoom back for the big picture on your VGA monitor. It also lets you cut and paste between files displayed in split-screen fashion.

Just because you can display a 132-column spreadsheet on a standard VGA monitor doesn't mean you can read all those tiny characters. But Splitword J-16 can zoom in on a critical portion of your worksheet to double or quadruple it in size.

This VGA graphics controller lets you zoom or unzoom your display with a single keystroke so that you can quickly focus to verify a detail, then take a step back for the bigger picture. The video card supports up to 800 by 600 resolution and lets you capture and view two or three text screens at once, even from different applications.

For example, save a word processing screen to your hard disk, exit the application, and load a spreadsheet. Your word processing document is still available for viewing; you can devote any amount of your display to the saved screen. You can cut and paste portions of one displayed screen to another, or even from a stored screen to an active one. And you're not limited to a single screen's worth of data. Each document you save for split viewing can consist of several screens.

The Splitword J-16 is compatible with CGA, MDA, EGA, and VGA monitors, but you need VGA to take advantage of zoom and split-screen capabilities. The 16-bit version retails for $345 with 256K of video memory; a slightly slower 8-bit version costs $245. The prices include drivers for *1-2-3* releases 2.*x* and 3.0, *Windows 286/386*, *GEM Desktop*, and several other major applications. The drivers support the high-resolution display as well as the zoom and split-screen functions. General Business Machines Corp., 5819 Uplander Way, Culver City, CA 90230; 800/228-3349, 213/216-0055. —*Mark Henricks*

Reader service no. 638

HEAVY

THE 20 MHz SUPER-386c FROM HYUNDAI.

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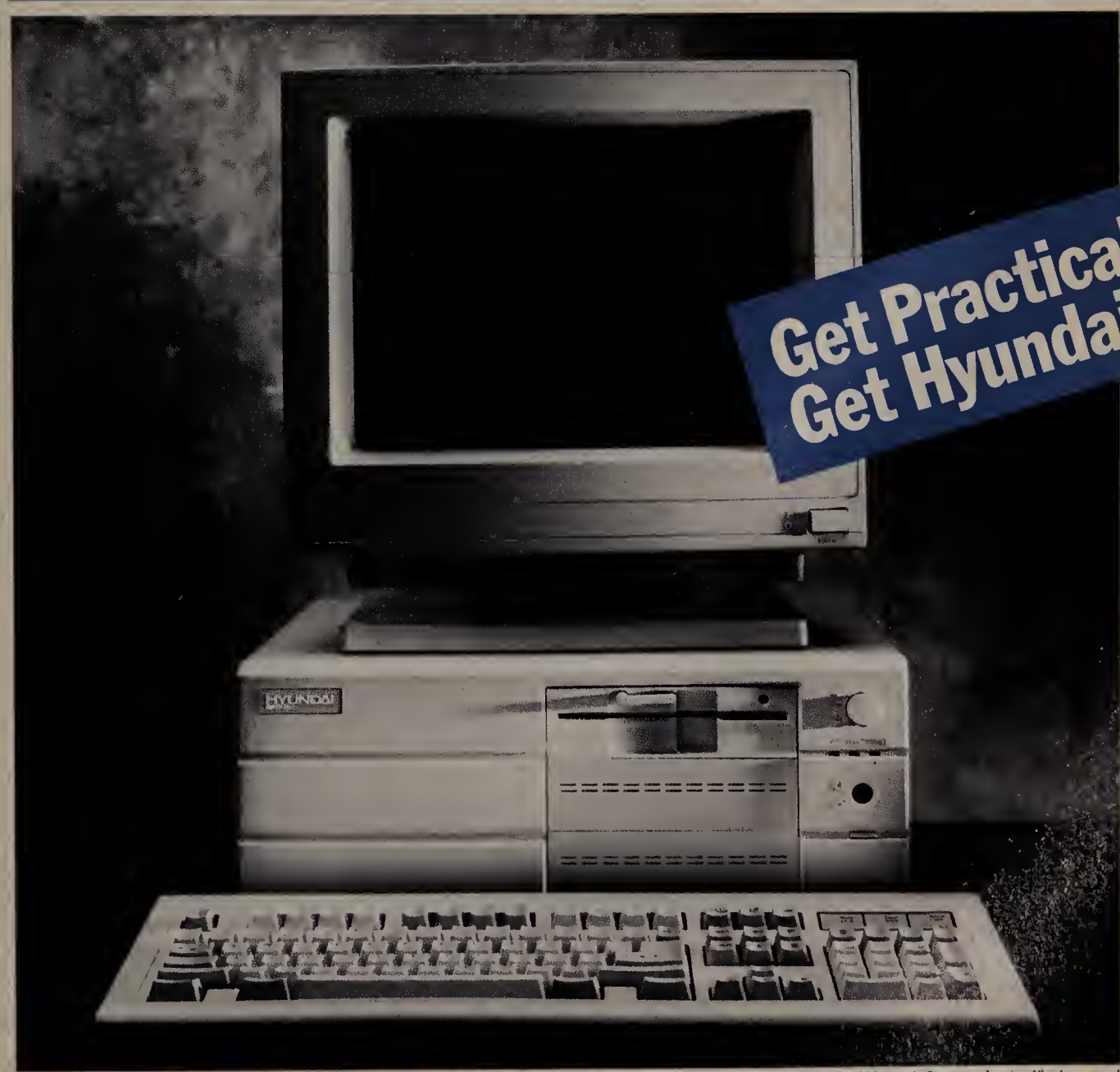

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HYUNDAI

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Coretape Light

High-Capacity Tape Drive Specializes in Rapid Recovery

Using simple DOS commands, Coretape Light lets you dig through 120MB or more of archival data on your backup tape and pick off just the file you want in under a minute.

Most tape backup systems can take 5 minutes to find a backed-up file. But using simple DOS commands, Coretape Light will find a 68K file, decompress it, and restore it for you in as little as a minute.

Your tape backup can thus serve not only as an archival system but also as an economical—albeit slow—storage and retrieval system. Free up space on your overextended hard disk by moving jumbo or little-used files to your Coretape system, and retrieve them one by one as you need them. Coretape Light also saves you dollars by exploiting the floppy controller already in your system.

Thanks to the use of ferrite—rather than brass—read/write heads, Coretape Light can back up or restore 120MB on DC2080 tapes and 300MB of compressed data on DC2120 tapes at the same speed: 2MB to 5MB per minute. Coretape Light employs the QIC-80 format. Although in theory it should be able to read and write to QIC-80 tapes from other manufacturers, Core reports mixed results. The system will read QIC-40 tapes without a problem, though.

The $545 system comes bundled with Coretape software, offers password protection, and allows you to back up by file, drive, and subdirectory. You can create batch files that can back up in your absence, but there's no macro facility. The system can append new backups to the same media without overwriting existing backups. Core Int'l, 7171 N. Federal Hwy., Boca Raton, FL 33487; 407/997-6055. —*Susan Lusty*

Reader service no. 637

PrintCache

Speedy Spooler

Freedom is what you expect from a print spooler: Instead of waiting for files to print, you want to move on to other tasks. *PrintCache* fills the bill better than most. It lacks a few features like print queuing, but that's because it focuses on the straightforward text jobs that make up 80 percent of printer activity.

Part of the secret is that *PrintCache* makes optimum use of your laser printer's memory. Employing a cunning algorithm, *PrintCache* lets you print even a full page of 300-dpi graphics on a low-end LaserJet with only 512K of memory—and fast! But the program is best suited to folks like *1-2-3* users who print mostly text (no amount of cunning lets you squeeze much white space out of a full-page photo).

The graphics optimization works reliably only on HP LaserJets and a handful of clone printers, including Oasis, Kyocera, and Brother. But *PrintCache* spooling works with virtually any make of LaserJet- or PostScript-compatible laser, dot matrix, or ink jet printer or plotter.

PrintCache offers clear, menu-driven installation with a solid selection of defaults, as well as customization options. It automatically loads with an application, using no more than 19K of conventional memory (as little as 5K if you have extended or expanded memory) plus whatever you devote to spooling. You can minimize RAM overhead by spooling to a disk buffer. LaserTools claims that *PrintCache* spools to disk ten times faster than most spoolers do to RAM. *PrintCache* requires DOS 2.1 or a later version and sells for $149. LaserTools Corp., 1250 45th St. #100, Emeryville, CA 94608; 800/346-1353, 415/420-8777. —*Mark Henricks*

Reader service no. 636

StorMor

A 20MB Floppy? Roll Over, Bernoulli!

New high-capacity floppy drives provide a competitive solution for backing up, securing, and transporting crucial data. With the StorMor drive from Q/COR, you get 21.4MB of formatted storage on a 3½-inch microfloppy disk, and it offers some distinct advantages over alternative methods.

With an average access time of 35ms, the StorMor is far faster than tape backups or regular floppies, although more expensive. But with its $25 preformatted barium-ferrite disks, it's a third the price of Bernoulli Box media on a per-megabyte basis and cheaper still than removable hard drive setups.

The drive—a blend of floppy and Winchester technologies designed by Brier Technology—achieves its tenfold increase in capacity over standard 3½-inch drives by using special media and writing atop densely packed servo tracks. The major drawback: At present, the StorMor won't read standard 720K or 1.44MB disks. Because of the exotic technology, you'll need to buy preformatted disks from Brier.

The $795 internal version of the StorMor includes an 8/16-bit SCSI adapter, cables, one preformatted 21.4MB capacity disk, a regular disk containing installation software, and hardware to fit the drive into a half-height 5¼-inch bay. It won't fit into a 3½-inch bay, Q/COR says. If you don't have a 5¼-inch bay open, the external version with enclosure costs $895. A Micro Channel–compatible external model is $995. Q/COR, 1 Quad Way, Norcross, GA 30093; 800/548-3420. —*Mark Henricks*

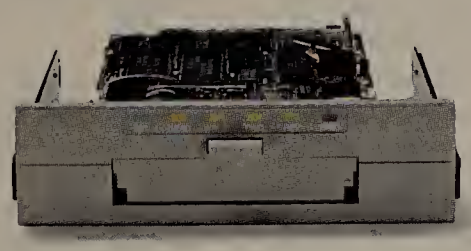
Reader service no. 641

Nelson Mandela freed.

Soviets adopt
multi-party system.

Berlin Wall falls.

Everex introduces quality
tape backup for under $400.



PC MAGAZINE EDITORS' CHOICE December 26, 1989 Excel 40AT

Maybe you hoped in your heart of hearts, but you probably never thought you'd see it. Really good backup for under $400.

Introducing the Everex™ Excel 40AT™ Floppy Tape Backup.

Actually, it's more than just good. It's outstanding. The unique drive head is ceramic hard-coated for greater durability. And when your head lasts longer, so does your tape drive.

What's more, the head has a built-in blade—also unique—that automatically cleans your tape. And when your tape lasts longer, so does the integrity of your data.

But the Excel 40AT is kind to you and your data in many other ways, too.

It follows the popular QIC-40 standard to support interchangeability of QIC-40 tapes. It formats cartridges while running other applications. It offers flexible backup and restore methods—all with built-in ECC and Reed Solomon error correction. It's even Novell® compatible, with an optional driver.

And best of all, it's fast. So fast PC Magazine ranked it number one among QIC-40 machines and awarded it Editors' Choice.

Are you ready for an historic development in tape backup? Call 1-800-821-0806 for the name of your nearest Everex Reseller.

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EVER for EXcellence

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Circle 59 on reader service card

Expense It

Timely Expenses

Waiting for reimbursements from expense reports is like waiting for a tax refund—anything that speeds the process is welcome. *Expense It* gives you a head start by letting you create expense reports on the road.

Pop-up windows in almost every field of your report prompt you to allocate expenses to the appropriate budget account, payment method, project, or client. The $199.95 program contains a billing-report facility, so service providers can create invoices with a few keystrokes, billing hours by client, project, or a combination of both.

Expense It has other time-saving features like a built-in calculator and currency conversion. You can easily convert those deutsche marks to dollars simply by supplying the current exchange rate. The package also calculates your auto expenses if you give it the mileage and per-mile reimbursement rate of your company. Afterward, you can export a *1-2-3*-compatible file to consolidate your report and others' into weekly, monthly, quarterly, and yearly expense reports.

Expense It ships with the eight expense forms approved by the Internal Revenue Service. You can also design a form suitable for your company, but that can take up to 2 hours the first time. For $25, On the Go Software will predefine your company expense forms for you if you send in a paper copy of the form. On the Go Software, 330 Washington St. #613, Marina del Rey, CA 90292; 213/578-9595. —*Susan Lusty*

Reader service no. 639

No reason to loan money to your company any longer than necessary: Expense It lets you get a head start on your expense report while you're still on the road—and in any format you want.

HotShot Presents

Simplified Charts

If speed and simplicity are more important for your presentations than fancy graphics and charts, *HotShot Presents* might be the ticket. Symsoft's no-frills $249 package lets you create simple word charts and tables to arrange into slide shows.

HotShot lacks the graphing capabilities, drawing tools, and clip art of sophisticated graphics packages like Ashton-Tate's $495 *Applause II*. It also lacks on-screen help, a way to do incremental saves, and even an undo function. And it won't accept downloadable fonts or run reliably on the leading LANs.

But *HotShot* will let you create and manage quick on-screen presentations you can turn into handouts, transparencies, or slides. You can set up your slide show to run automatically or interactively, using 11 transitional effects.

To create a slide show, you customize existing templates for a word chart, organizational chart, or simple table, then enter text into a bidirectional outliner. The text automatically feeds into the slides in the style you've chosen; conversely, typing text directly into a slide automatically produces an outline. You can then edit individual slides or modify the template to change all the slides.

HotShot provides a variety of bullets, lines, and boxes, plus Swiss, Dutch, and two headline fonts. You can mix 16 screen colors from a palette of 64. You can also import PCX, TIFF, PIC, IMG, and MacPaint files to create graphics slides, then zoom in or pan across the image. A unique feature lets you insert an icon into a text slide, then click on it to reveal the entire graphic. *HotShot Presents* requires 640K, DOS 2.1 or a later version, and 3MB of hard disk space. Symsoft, 924 Incline Way, Call Box 5, Incline Village, NV 89450; 702/832-4300, 702/832-4310 (fax). —*Daniel Tynan*

Reader service no. 640

LZR 650

Light-Duty Laser

If you've tried to press a low-cost personal laser printer into service as a network printer, you know that more than price separates these newcomers from bigger-ticket models. The $1695 LZR 650 laser isn't ideal for net use, but it does pack enough power to do light duty for a small work group.

At 6 ppm, the LZR 650's Sony engine turns out 50 percent more copy per minute than the Hewlett-Packard LaserJet IIP, and it carries more standard emulations and better paper handling for only a couple of hundred dollars more than the IIP. The 300-dpi printer has five built-in emulations, including Diablo, Epson FX-80, IBM Proprinter, IBM Graphics Printer, and HP Series II.

At just 13 by 14 by 10 inches, the LZR 650 is small enough to fit on your desk. But even if it's across the room, you can control the paper source, shift print orientation, and download soft fonts using a pop-up software utility. There are also two slots for Dataproducts' proprietary font cards.

The $169 print drum cartridge is good for 60,000 pages, and the $132 developer kit has a 25,000-page life. The $60 toner kit has a 3000-page life at a 4 percent ink-to-page density. The average cost per page of consumables is about 3 cents, comparable to the HP IIP's.

The $1695 price includes a 250-sheet input cassette (compared with the IIP's 50-page cassette) and matching output tray, two outline fonts, and 512K of memory. Memory can be expanded up to 4MB, and you can add a 250-sheet auxiliary input bin for $369 and a 40-envelope autofeeder for $399. Custom font cards are $149 to $239 each. Dataproducts Corp., 6200 Canoga Ave., Woodland Hills, CA 91365; 800/624-8999 ext. 583, 818/887-8000. —*Mark Henricks*

Reader service no. 642

Now the leading PC project manager is available on the Macintosh®.

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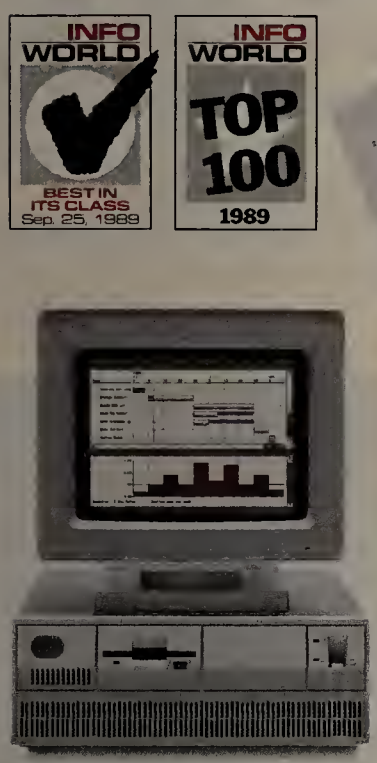

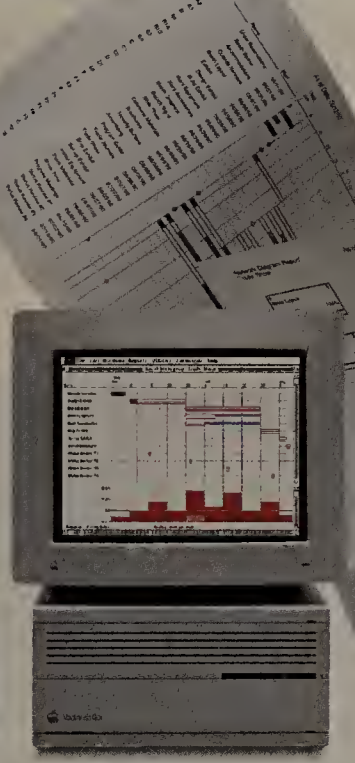

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Scitor Corporation

ITC 386 CEL

PC, Phone Home—This Portable SX Adds Cellular Support

At first glance, the 15-pound, battery-powered 386 CEL doesn't look too different from other high-end luggables. A 16-MHz 386SX CPU bolstered by 4MB of memory and a 40MB drive is a nice feature, but it doesn't seem to justify the sobering price of $8695.

But slide the hand-held Motorola cellular telephone/antenna from its discreet recess, and the 386 CEL begins to show its stuff. With it, you can make calls on nearly any cellular phone network in the world. You can use it for making voice calls, exchanging files, tapping into distant data bases, or engaging in virtually any communications activity that could occur over dial-up lines. That feature could make it an indispensable tool for on-site service technicians or auditors who must stay in touch with the home office whether or not there's a phone handy at the job site. You can even plug a facsimile machine into the RJ-ll port and fax on the fly.

An on-board 2400-bps modem is equipped with MNP level 5 data compression and error correction software. One caution: Radio transmission wolfs power, so talking or sending data over the cellular phone cuts sharply into the 3-hour maximum life of the nickel-hydride rechargeable battery.

You also can slide the phone out and use its self-contained power source for voice calls. Other options include using the system's standard AC power adapter or its 12-volt DC auto adapter, which gives you unlimited power if a car is handy.

The 386 CEL holds 4MB of memory on the system board, but you can reach 16MB using its single 8/16-bit expansion slot. A 1.44MB 3½-inch drive is standard, as are math coprocessor support and a port for hooking up an external floppy. The 40MB, 28ms hard drive has a built-in controller. But the design requires a 2½-inch model, precluding upgrade options. If you tire of the CEL 386's VGA monochrome screen, you can plug an external VGA color display into the standard video port. Intelligence Technology Corp., 16526 Westgrove, Dallas, TX 75248; 800/356-3493. —*Mark Henricks*

You can make calls on nearly any cellular phone network.

Reader service no. 643

UPDATE

Magellan 2.0

Better Navigation

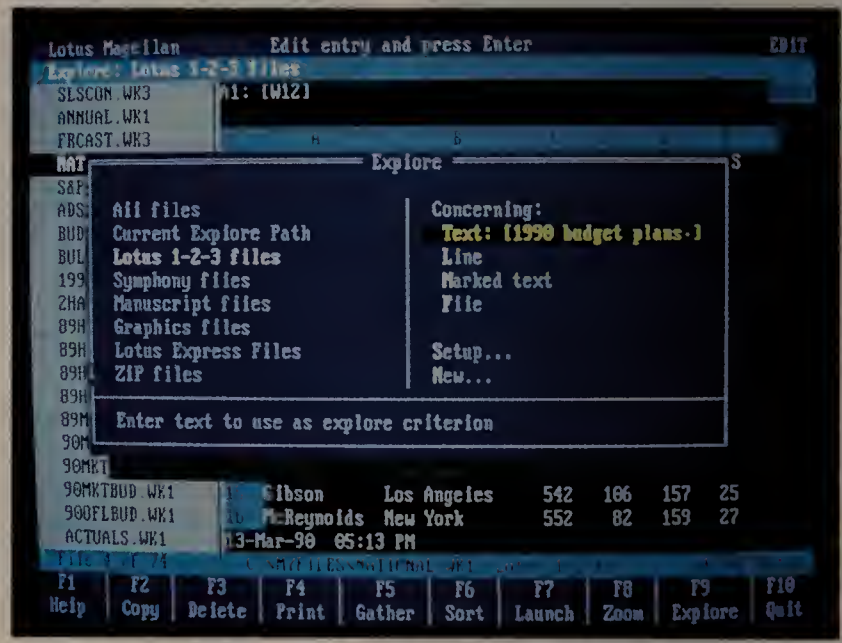
Lotus's *Magellan* significantly altered our expectations of high-end DOS shells, not only popularizing file viewing but introducing file lists across subdirectories and program launching from data files. Version 2.0 ups the ante again.

Thanks to an agreement with PKWare, *PKZIP* program code has been incorporated into *Magellan*, providing access to this widespread file-compression utility directly through a menuing system. What's more, you can now use *Magellan*'s 38 viewers to examine the contents of the compressed files within a ZIP file.

These viewers include several that run in graphics mode and a text-based one for *Microsoft Excel*. *Magellan* can now use viewers, with their ability to match a data file to its application without relying on extensions or subdirectory location, for launching applications from a data file. This is handy if your application doesn't reserve data file extensions for its own use and you put files from more than one program in a directory.

Two other new features that exploit the file viewers are Undelete and Compare. *Magellan 2.0* lets you see the contents of deleted files before undeleting them. The File Compare command screens out the formatting of two different types of data files so that, for example, *WordPerfect* and *WordStar* versions of the same file can be compared, with only the differences in text content being noted.

Magellan can now do backups, selecting files that match your backup criteria (such as date or archive bit) and copying them onto floppies. Large files may be split to fit on floppies, but otherwise files and directory structures are copied unchanged.



With Version 2.0 of Lotus's Magellan, you can dip in and take a peek at more kinds of files—even compressed files—and it's easier to compare them for deletion as well.

Function key assignments are configurable; you can assign any command or macro to each key. The program can now perform unindexed in addition to indexed string searches, offering you a choice of saving either time or hard disk space. There is still, alas, no mouse support.

Magellan 2.0 requires 384K and DOS 2.0 or a later version. The package lists for $139, with upgrades available for $39. Users of *PC Tools Deluxe*, *Norton Utilities*, *Norton Commander*, and *XtreePro Gold* can purchase *Magellan* for $49. Lotus Development, 55 Cambridge Pkwy., Cambridge, MA 02142; 617/577-8500. —*Lincoln Spector*

Reader service no. 644

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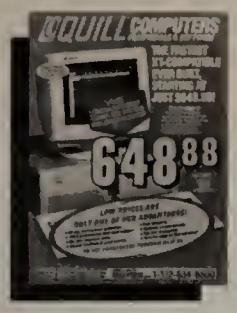

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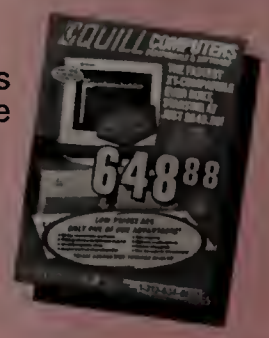

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*All prices include monitors.

The Q-TECH 386-SX has the power of a 386 at a 286 price. See your business growing? With the SX, you'll be able to expand and take advantage of high-powered software, perform CAD, do desktop publishing and use it as a file server. Powerful processing power for today's demands–as well as tomorrow's!

The Q-TECH "286-12" AT-compatible computers are U.S. made and use the speedy 80286 processor. The power of a 286 is ideal for most small businesses and you can upgrade easily and inexpensively by adding additional disk drives, tape back-up systems, graphic adapters and modems. Dependability and solid features at a sensational low price. 286-16, 286-20, 286-25 also available.

The Q-TECH 386-20–need the power and sophistication of a 386-20MHz system? It's the natural choice as a file server for an LAN. Graphics-intensive applications such as desktop publishing and computer-aided designing need a 386-20, as do users of large spread sheets and extensive data bases. The 386-20 is your best investment for the future. 386-25 and 33 also available.

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PC Tools Deluxe 6.0

Utilities Unlimited

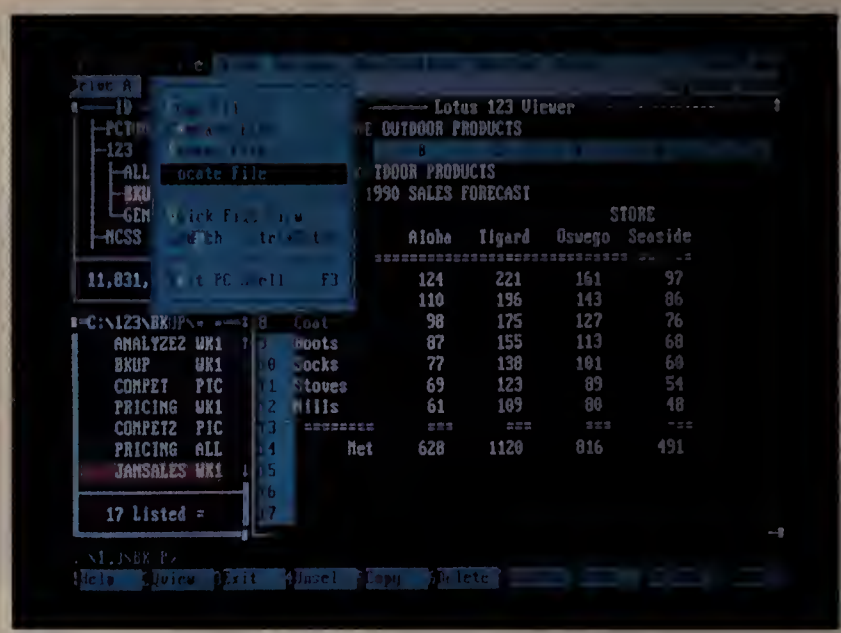
PC Tools Deluxe has long endeavored to be the ultimate utility package, putting in every tool you might need. With version 6.0, Central Point Software aims to make each tool the best of its kind.

The DOS shell has undergone a complete face-lift. As with *Norton Commander*, you get both a menu-driven shell and a command-line interface on screen; the DOS prompt is there, ready for action. The shell can be RAM-resident, enabling you to bring it up from inside an application. You can even bring up one *PC Tools* application from inside another one.

The shell is now highly configurable. Function keys can be assigned to any command, and the pulldown menus can be set to beginner, intermediate, or advanced level. A file-locate option lists files that meet set criteria, even across subdirectories. Over 20 file viewers have been added, and a bundled version of Traveling Software's *Lap-Link* lets you easily transfer files over serial cable between two computers.

The backup program now supports DOS-formatted disks and QIC 40/80 and Irwin tape standards. Furthermore, you no longer need a fresh floppy disk every time you back up incrementally.

A data-recovery tool, Diskfix, can diagnose and correct a number of disk problems, including cross-linked files, file-allocation-table errors, and corrupt directory information. The Desktop Manager TSR now includes an auto-dialer, data base indexes (unfortunately not *dBASE* compatible), and fax-board support.



You'll find a more flexible interface in version 6.0 of PC Tools Deluxe. You can work comfortably either from the DOS prompt or with the shell's menus, which are now far easier to configure.

PC Tools Deluxe 6.0 requires DOS 3.0 or a later version; the various modules have different memory requirements. The package lists for $149, and users of version 5.5 can upgrade for $30. Central Point Software, 15220 N.W. Greenbrier Pkwy. #200, Beaverton, OR 97006; 503/690-8090. —*Lincoln Spector*

Reader service no. 645

Time Line 4.0

The Friendliest Project Manager?

Time Line claimed market leadership largely because its character-based screens proved the friendliest among project management rivals. Now Symantec steps into the land of graphical user interfaces with text-based windows and mouse support. The upgrade also includes a *Harvard Graphics*–style slide maker, a PostScript printer driver, and support for 43-line EGA and 50-line VGA monitors.

The spreadsheet-style (rather than formlike) interface lets you change something as small as a number or letter with a mouse click. You also can revert to the old function key editing method.

Time Line 4.0 comes ready to work across LANs, provided you buy a "bump disk" to make the single-user version LAN-ready. The macro capability previously supplied by third-party vendors is now bundled as an optional feature. *Time Line 4.0* also provides access to expanded and extended memory.

Features like the new Work Breakdown Structure manager make *Time Line 4.0* more applicable to government contract work. Beginners will appreciate simple utilities that work with a library of preformatted layouts, filters, and color palettes.

The price of *Time Line 4.0* has risen from $595 to $695; updates are $199 for 3.0 users, but only $149 if you also own a copy of *Time Line Graphics*. *Time Line 4.0* requires 640K, DOS 3.0 or a later version, and a hard disk. Symantec Corporation, 10201 Torre Ave., Cupertino, CA 95014-2132; 800/441-7234, 800/626-8847 California. —*Mark S. Burgess*

Reader service no. 646

FormWorx System 2

Functional Forms

Windows-based forms designers make it a breeze to create forms and tie them together through underlying data bases—they let you collect more information more easily and in more usable formats than ever before.

FormWorx System 2 gives you a box full of typical form objects you can point and drag together on a WYSIWYG screen display running under *Windows*. *FS2*, a modernization of FormWorx's character-based forms software, offers many design shapes, including address labels and checklists as well as squares and rectangles. Add your own logo, and you can make line-drawn forms a thing of the past.

You may not have to build any forms at all: The package has more than 500 standard forms for government agencies, financial departments, sales directors, and general business users.

FS2 incorporates a *dBASE*-compatible relational data base, effectively giving you a screen-design and report-generating front end that many *dBASE* programmers would be hard-pressed to match. You link your form to a data base by answering dialog boxes. When forms are tied together, you can type in a part number on an order form and have the part description and current price automatically filled in.

The $395 *FS2* requires an AT or 386 with a hard disk, 640K, DOS 3.0 or later, and *Windows/286* or *Windows/386*. Upgrades for registered users of character-based FormWorx products are $95. FormWorx, Reservoir Pl., 1601 Trapelo Rd., Waltham, MA 02154; 800/992-0085. —*Mark Henricks*

Reader service no. 648

DacEasy Accounting
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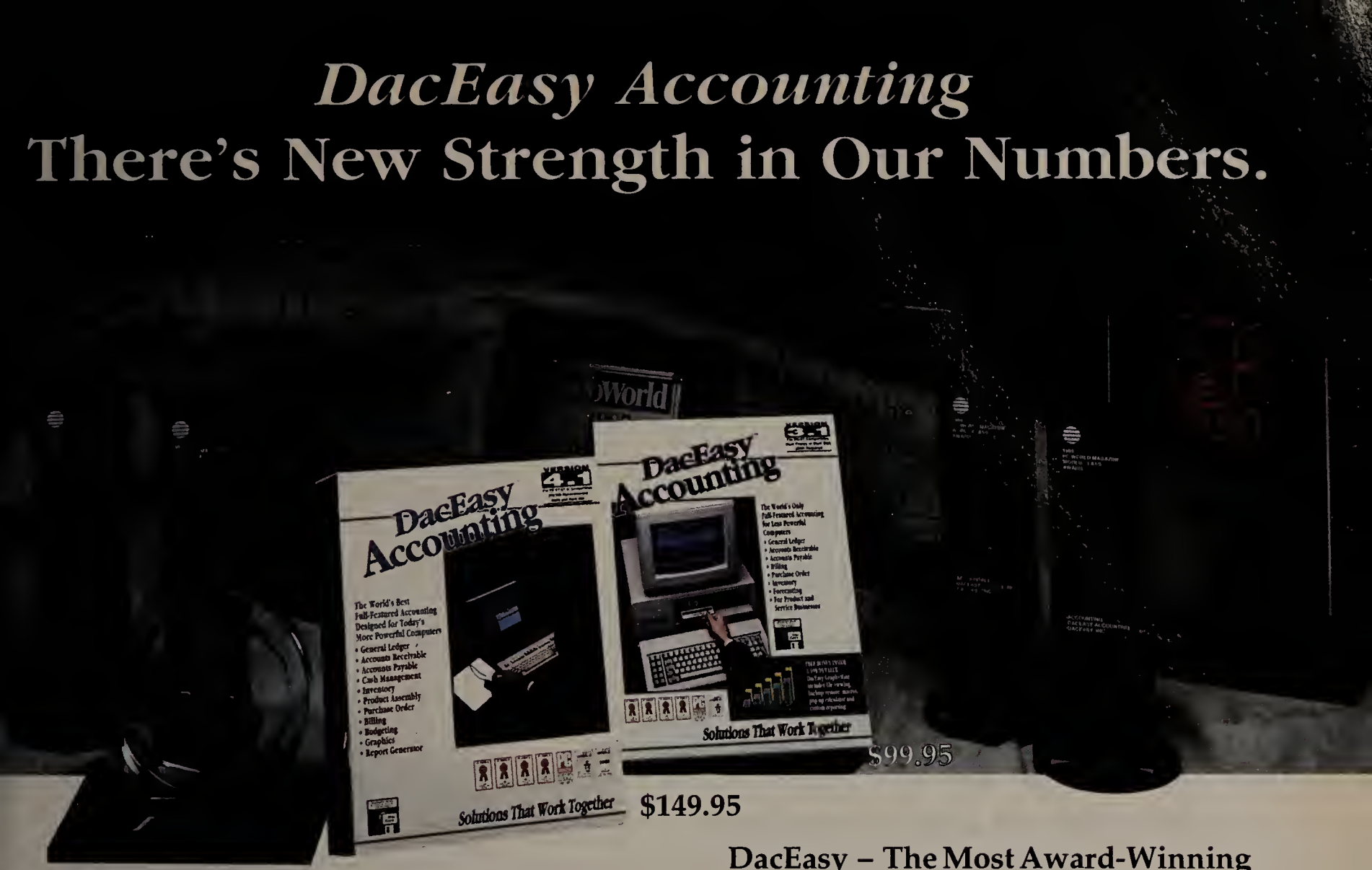

The World's Bestselling Accounting Software Now Comes With a Choice.

Introduced in 1985, DacEasy Accounting has become the number one choice of businesses worldwide. Now that we've introduced Version 4.1, our newest member of the family and platform for the future, we've given you the perfect accounting choice for the 90's. For those of you with older or less powerful computers, we continue to offer Version 3.1, the only full-featured, award-winning accounting program ideal for your environment.

Both Version 4.1 and Version 3.1 offer fast and easy installation that takes just minutes, plus feature-rich, powerful performance. These are a few of the many reasons why more than 1/2 million businesses have computerized the DacEasy way.

Version 4.1, The Best Accounting Choice for the 90's.

Version 4.1 has already acquired two major awards since its introduction last Fall. Version 4.1 features **TEN** fully integrated modules: ***General Ledger, Accounts Receivable, Accounts Payable, Purchase Order, Billing, Inventory, Product Assembly, Graphics, Report Generator*** and ***Cash Management.*** Unlike Version 3.1, Version 4.1 requires 640K memory and a hard disk. We also recommend (not required) a 286 processor for faster performance.

New time-saving features found only in 4.1 include ***automatic look-ups, optional mouse support, cash management, reconciliation, custom report generator, graphics, budgeting, multiple open periods, sales analysis, product assembly, monthly detail, import/export capabilities*** and ***much more.***

Version 4.1 has been the fastest selling accounting package in our history. The value is tremendous, especially, when your business is ready to grow into a network capacity. Version 4.1 transfers your files effortlessly to the DacEasy Accounting Network System.

DacEasy – The Most Award-Winning Accounting Program Ever.

Version 4.1 was recently voted the Accounting Product of the Year by the readers of *InfoWorld* magazine. We have won an unprecedented four straight *PC World* World Class Awards voted by its readers. The awards selected by the users are our most treasured. Naturally, we love the *PC Magazine* Editors' Choice awards, too, and have won more than any other accounting software publisher.

Both our accounting versions are backed by a great supporting cast of DacEasy products. DacEasy Payroll 4.1 stands alone or integrates with DacEasy Accounting 4.1. Also available are videos, self-paced tutorials, nationwide seminars and our new DacEasy Advantage Club support program.

We also offer Accounting, Payroll and Video Tutorials in the DacEasy BonusPack for only $299.95 retail. And these programs are easily upgradeable to the new DacEasy Network Accounting System ($499.95 retail) at special upgrade prices.

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Version 3.1 is the only full-featured accounting program that can run on a dual floppy system, or a hard disk with limited space. It only requires 256K of RAM, yet is power packed to get the job done. Ideal for service or inventory based businesses, Version 3.1 features **SEVEN** integrated modules: ***General Ledger, Accounts Receivable, Accounts Payable, Inventory, Purchase Order, Billing*** and ***Forecasting.*** Plus, we've included a **FREE** optional utility program, DacEasy Graph+Mate, a $99.95 value!

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1-800-877-8088

(In Canada Call 416-940-3314) • International FAX 214-248-1239

Minimum Hardware Requirements: Accounting 4.1 requires 640K RAM, Hard Disk, IBM or compatible PC; MS-DOS / PC-DOS 3.0 or later, Monochrome or CGA monitor, mouse optional. Accounting 3.1 requires 256K RAM, 2 floppy disk drives, IBM or compatible PC; MS-DOS/ PC-DOS 2.0 or later. • MS-DOS, PC-DOS, IBM and Microsoft are trademarks of their respective corporations. DacEasy is a trademark of DacEasy, Inc. Copyright © 1990, DacEasy, Inc. All rights reserved

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Media Code: 220

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Professional Accounting Series 2.0

Cyma's Small-Business Series Gets Long-Overdue Update

After five years without a major upgrade to its *Professional Accounting Series (PAS)*, Cyma is shipping a complete revamp that it hopes will make the series a contender in the fast-growing small-business accounting market.

At the core of version 2.0 is a system manager that links the other modules together and adds some interesting capabilities. Those include a DOS shell for executing DOS commands from any input screen, a report generator, a pop-up calculator accessible from any field, and a "scanning" feature that works across all modules for quick access to specific customer or account information. With *PAS 2.0* you don't have to close your books at the end of the month, and you can change any prompt in any field to make it specific to your business or industry.

Designed for companies with no more than 500 employees or $25 million in revenues, *PAS* has a multiuser option that supports up to 99 concurrent users on a network.

The system manager sells for $495 for the single-user version and $895 for the network version. Other modules —including accounts payable, accounts receivable, inventory and order processing, and job control—range in price from $695 to $995. But don't look for *PAS* at your nearby software dealer; it's sold only through value-added resellers who customize the package for individual sites and provide training and support.

PAS requires 640K, DOS 3.1 or later, and a hard disk; a 286 is recommended. Upgrades from *PAS 1.3* are $100 per module. Users who bought version 1.3 after October 1989 can upgrade free of charge. Cyma, 1400 E. Southern, Tempe, AZ 85282; 800/292-2962. —*Roberta Furger*

Reader service no. 647

Fontware 3.0 Starter Kit for Windows

Font Maker Shares Code, Saves Space

An upgrade of the *Fontware* soft-font-generating kit for *Windows* offers improvements that speed font generation, conserve printer memory when using large fonts, and allow *Windows* applications to share disk-hogging font files with non-*Windows* packages.

Aldus's *PageMaker, Microsoft Excel,* and *Word for Windows* come with a coupon offering the *Fontware 3.0 Starter Kit for Windows* for $25. The kit contains the font-generation program along with four weights of the Swiss and Dutch fonts (Bitstream's versions of Helvetica and Times Roman). A retail edition of the kit costs $60.

Version 3.0 generates fonts five to eight times faster than version 2.0, according to Bitstream. And *3.0*'s code- and font-sharing abilities will especially please desktop publishers who write in *WordPerfect 5.0* and then publish with *PageMaker* or another *Windows* program.

The new version takes advantage of the 80 percent of the code that's typically shared among various application-specific *Fontware* programs. With older versions, adding a new *Windows* program meant several megabytes of near-identical program and font-outline files on your hard disk; now you can avoid that.

Perhaps more important, *Fontware 3.0* lets you share the generated fonts themselves—as long as the character sets match between applications. Previously, a font that was compatible with *WordPerfect* would not work for a *Windows* application, and vice versa.

Additionally, *Fontware 3.0* saves printer memory with pared-down ASCII-only and business-oriented character sets, letting you create custom character sets composed of just those letters and symbols that you'll actually need. Bitstream Inc., Athenaeum House, 215 First St., Cambridge, MA 02142; 800/522-3668, 617/497-6222. —*Scott Spanbauer*

Reader service no. 606

PC-Trac

Trackball Is Built for Speed, Precision

MicroSpeed doesn't mouse around with ergonomics, resolution, or footprint in the newest version of its PC-Trac trackball. Equipped with a generous wrist rest, a 2¼-inch-diameter ball, and a dpi range of 50 to 1000, PC-Trac is a pointing device built for comfort, speed, and precision.

Oversize buttons wrap around the ball and along the sides of its elongated 3¾-by-6¾-inch frame, making it easy to handle. The gently sloping wrist rest reduces fatigue and lets you keep your thumb and little finger on the left and right buttons while your other fingers spin the ball. The buttons can be programmed for right- or left-handers, and an automatic lock feature eliminates the need to continually press a button to drag the cursor. Although bigger than a mouse, PC-Trac takes up far less than the territory a mouse needs to roam.

The device's KeyMap utility lets you build up to 12 macros from modifiable templates for DOS and 19 popular software applications. You can run your *WordStar 5.5* spelling checker with a few button clicks or jump from field to field in *Q&A* by rolling the ball with your fingertips.

PC-Trac has automatically adjusting ballistics so you get higher or lower resolution depending on how fast you spin the ball. Roll it a tad, and you get precise control for rounding corners on fonts in *Corel Draw*. When you need to speed through a full page in *Ventura*, let it spin.

PC-Trac is Microsoft Mouse–compatible and lists at $119 for the serial version, $139 for the bus version. MicroSpeed Inc., 44000 Old Warm Springs Rd., Fremont, CA 94538; 800/232-7888, 415/490-2403. —*Glenn Grant*

Reader service no. 669

For more information about any product, contact the manufacturer or circle the number on the reader service card.

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Work-Group Software Worth Waiting For

Today's groupware contenders promise to give your business a competitive edge by helping people communicate better. Unless you can afford $62,500 for Lotus Notes, however, be prepared to settle for some compromises.

Robert Lauriston

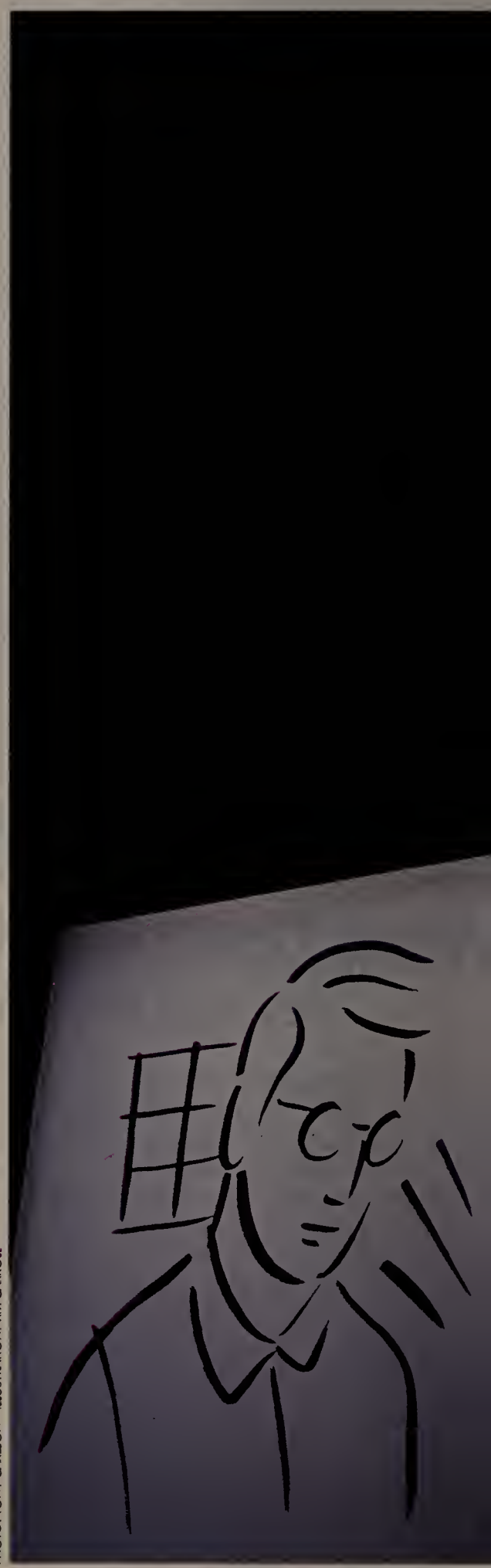


PHOTO: TONY CARLSON ILLUSTRATION: TIM CARROLL

Most departments set up local area networks (LANs) to share peripherals. But once they're linked, many find electronic mail the biggest plus of all: Combining the immediacy of a phone call with memorandum-style distribution improves productivity in unexpected ways. Groupware takes E-mail a step further, adding personal productivity tools and multiuser data management. Depending on the program, groups can jointly manage schedules, documents, conversations, addresses, or projects. The goal is better intraoffice communication and greater efficiency.

Groupware's first and foremost duty is to provide solid E-mail—few users want the confusion, costs, and training hassles of fielding two E-mail systems. All of the eight packages reviewed here include at least rudimentary E-mail.

Groupware's other major function is to coordinate schedules, eliminating confusion and delays in setting up meetings. Five of the programs have group schedulers, and six sport personal calendars. A group scheduler lets users look at block views of their associates' appointments and automates the etiquette of invitation and acceptance. Having a personal calendar in close proximity to E-mail is also important. Because intraoffice correspondence deals with establishing deadlines and meetings, it makes sense to combine messaging and scheduling.

The typical groupware package combines LAN E-mail with personal and group schedulers, and an address data base. Into this broad category fall Enable's *Higgins*, Advanced Concepts' *Office Minder*, Data Access's *Office Works*, Futuresoft's *Right Hand Man*, and WordPerfect's *WordPerfect Office*.

The other three programs reviewed lack group scheduling, and each takes its own tack. Action Technologies' *The Coordinator II* offers an E-mail system based on distinct message types, and Information Research's *Syzygy* dips into project management. Lotus Development's *Notes*, a multiuser text data base that runs under OS/2 and *Windows*, is far more ambitious. Designed to let users communicate, disseminate, and analyze unstructured data within a work group, *Notes* offers users the development tools for weaving E-mail, hypertext, word processing, conferencing, and document-management into new applications (see the sidebar "Notes Lives Up to Its Notices").

If not for the steep $62,500-per-server price tag, *Notes* would be the clear Best Buy. As it is, this roundup will be denied the Best Buy blue—proof that groupware is still a young field that needs improvement.

Despite flaws, there are some good values here that begin to deliver on the promise of improved work-group productivity. And more groupware is on the way. The frenzied pace of development is evident from the other sidebars accompanying this article: "Impending Upgrades" discusses the new versions expected soon from many of these vendors; "Simply Scheduling—Groupware Without E-Mail" examines scheduling-only groupware packages; "Coming Soon: Icons for Organizations" looks at upcoming packages.

Buyer Be Aware

Despite a multiplicity of oddball features and philosophies, these packages have many features in common. When you're deciding which one to buy, first consider the strength of the package's E-mail. Personal calendars and group scheduling are next in importance.

Groupware's first and foremost duty is to provide solid E-mail.

Then look at extras such as card-file data bases, expense reporters, Gantt charts, macros, and calculators.

Finally, you must evaluate each package on how well it fulfills its specific promises. Will it really make setting up meetings easier? Will it make your deadlines stick, keep projects under control, improve communication? In short, will it boost productivity?

Inherent in all these questions is ease of use. No matter how flashy the feature set, the program fails if it's too difficult to learn and use. Since everyone in the office will use groupware, the program must be intuitive for novices as well as experts. Ease of installation isn't really a factor: All the programs in this roundup install quickly and easily via menu-driven utilities. Here's a more in-depth look at the buying criteria:

Messaging Most of your groupware time will be spent on basic E-mail messaging tasks. With the possible exception of *Lotus Notes* and *Higgins*, none of these packages meets the standard set by top E-mail programs like *cc:Mail*, *DaVinci eMail*, or *The Network Courier*. Still, most include the make-or-break features required for efficient communications. At a minimum, a program should offer distribution lists, carbon copies, and the ability to forward and reply to messages. You also need an adequate built-in text editor, text file import, and the ability to attach formatted files to messages.

Other helpful but nonessential features include the ability to attach a return receipt to a message so you're notified when the recipient reads it. Electronic phone-message forms are handy for offices without voice mail. As for text editing, it's nice to be able to save message drafts and to view a message in one window while replying in another.

Other pluses: *Lotus Notes*, *Office Minder*, *Right Hand Man*, and *WordPerfect Office* allow you to swap messages without exiting your application. All of the reviewed programs save *Syzygy* let you load a smaller TSR (memory-resident program) that beeps or flashes a message when E-mail arrives or an appointment is near.

Message management is also important—you'll be surprised at how the E-mail piles up. Unfortunately, most packages lag far behind E-mail–only products in this regard. Only *Higgins*, *Lotus Notes*, and *Right Hand Man* offer the essential element: the ability to store messages in easily accessible organizational folders. Only a few packages let you archive restorable messages to disk or tag multiple files for global deletion, copying, or other tasks. In this category, *Lotus Notes* does it all.

Connectivity If your business is linked to the outside world via fax, modem, or LAN gateway, you'll want connectivity links. Only *Higgins* rivals the connectivity power of a *cc:Mail*, and several packages offer no links at all.

SIMPLY SCHEDULING—GROUPWARE WITHOUT E-MAIL

Eric Brown

If you're interested in group scheduling, but you need top-notch E-mail features and connectivity options, you may find the current crop of groupware packages too limited. And if you already have a capable E-mail system, you probably won't want to switch to groupware or maintain two parallel E-mail systems. Fortunately, you have another option: Several packages offer group scheduling but forgo E-mail options. In some cases they also offer productivity and product-management tools.

The drawback to divorcing E-mail from scheduling is that typically users must monitor two programs to keep up-to-date, and invitations and confirmations aren't reflected in E-mail. Thus, users would have to check their scheduler to find out about a tentative meeting. Also, dual user lists must be continually updated, and ad hoc appointments and deadlines spread via E-mail are inconveniently separated from personal calendars.

But until groupware can rival standard E-mail packages at messaging and connectivity, these schedulers have their niche. Here are summaries of existing and upcoming group schedulers:

About Time 1.0. A pure group-scheduling and personal-calendar program, *About Time* offers daily, weekly, monthly, semiannual, and annual calendar views. The program provides repetitive-appointment scheduling, a to-do list, and numerous calendar-printing options. The group scheduler automatically finds conflict-free meeting times, and you can view or edit blocks or details of others' schedules, depending on your assigned privilege level. *About Time* lets you schedule resources, set alarms, and attach messages to meeting invitations. In the third quarter of this year, Softsystems also plans to release a full-fledged groupware package called *Time Frame* that includes E-mail, document management, and project-tracking features.

Network Scheduler II 5.0. Another personal and group scheduler, *Network Scheduler II* offers automatic group-meeting notifications and confirmations. You can assign privilege levels, and you can hotkey between group and personal schedules. The program also provides an editor and an address data base. The latest version offers partial integration with *cc:Mail, The Network Courier, DaVinci eMail,* and other MHS-compatible packages. Under this scheme, you can send invitations via E-mail and switch between the two programs with a single keystroke. However, the ability to share user lists varies, depending on the E-mail program.

Polaris PackRat for Windows 2.0. A combination PIM, group scheduler, and productivity tool kit, the multiuser version of *PackRat* offers personal and group calendars, an expense log, a to-do list, a card-file data base, and other utilities. A *Windows*-based product, *PackRat* lets you separate users into distinct groups that can share documents and schedules.

Who-What-When Enterprise 1.0. This multiuser version of Chronos's *Who-What-When* scheduling program is due out by the time you read this. In addition to a to-do list and a personal calendar, it has a complete group scheduler. Like *Syzygy,* the program includes project-management features such as Gantt charts, a project outliner, and other project-related views. A relational data base provides cross-references with addresses and other data.

Eric Brown is senior associate editor at PC World.

For more information about all products in this sidebar, circle reader service no. 908.

WHERE TO BUY

About Time 1.0
Softsystems
21308 Pothfinder Rd. #209
Diomond Bar, CA 91765
800/456-7638 (orders),
714/860-2070 (information)
LIST PRICE: 4 nodes $195, odditional nodes $49 eoch (or $495 per server)
Reader service no. 693

Network Scheduler II 5.0
Powercore Inc.
1 Diversatech Dr.
P.O. Box 756
Monteno, IL 60950-0756
800/237-4754, 815/468-3737
LIST PRICE: 8 users $495, 25 users $695, 50 users $995
Reader service no. 694

Polaris PackRat for Windows 2.0
Poloris Software
1820 S. Escondido Blvd. #102
Escondido, CA 92025
800/338-5943, 619/743-7800
LIST PRICE: 3 users $695, eoch odditional user $150
Reader service no. 695

Who-What-When Enterprise 1.0
Chronos Software
555 De Horo St. #240
Son Froncisco, CA 94107
800/777-7907, 415/626-4244
LIST PRICE: 6 users $695, each additional user $99
Reader service no. 696

FEATURES EVALUATION

The Groupware Acid Test: Look at E-Mail First

To improve group productivity, nothing's more important than competent E-mail. For now, Lotus Notes and Higgins are tops in the groupware category, thanks to strong mail features.

● Yes
○ No
◒ Deficient
▼ Limited only by available disk space

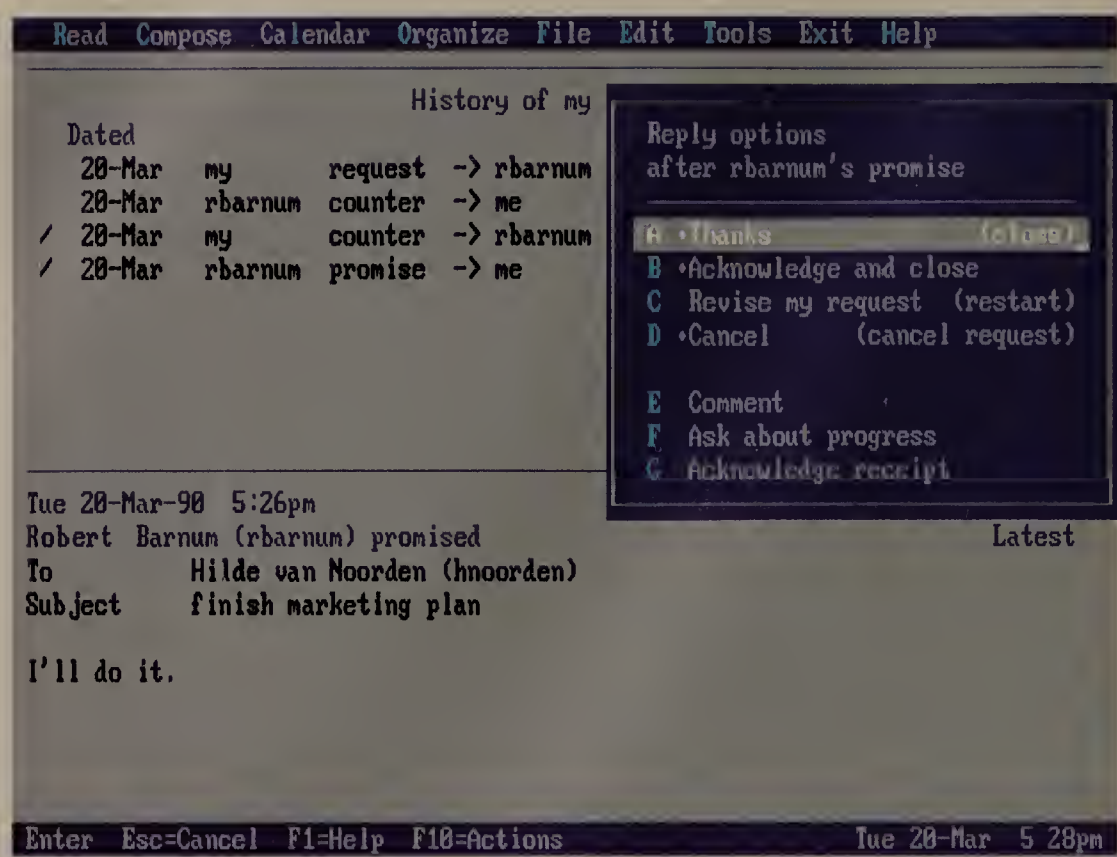
	The Coordinator II 2.01	Higgins 2.3	Lotus Notes 1.0	Office Minder 1.02c	Office Works 1.1	Right Hand Man 4.91	Syzygy 1.03	WordPerfect Office 2.0
Messaging								
Maximum file attachments	1	26	▼	10	27	1	0	24
Priarity classificatians	0	2	3	0	9	0	2	0
Memory-resident message natificatian	●	●	●	●	●	●	○	●
Memary-resident messoging	○	○	●	●	○	●	○	●
Carban capies	●	●	●	●	●	○	◒[1]	○
Blind carban copies	○	○	●	○	○	○	○	○
Return receipt	○	●	○	●	●	●	●	●
Private mailing lists	●	●	●	●	○	○	○	●
Public mailing lists	●	●	●	●	●	○	○	●
Farwards mail	●	●	●	●	●	●	○	●
Reply ta message	●	●	●	●	●	○	○	●
See message while replying	●	○	●	◒[2]	●	○	○	○
Bulletin baards	○	○	●	○	○	○	○	○
Phane message farm	○	●	●	●	●	●	○	●
Text editor								
Imports ond exports ASCII files	●	●	●	●	●	○	○	●
Saves drafts	●	●	●	○	●	○	○	○
Preserves single-spaced farmats	○	○	●	●	○	○	○	●
Screen capture utility	○	○	○	●	○	●	○	●
Message management								
Stares mail in folders	○	●	●	○	○	●	○	○
Threaded messages	●	○	●	○	○	○	○	○
Saves capies af outgoing moil	●	●	●	●	●	○	●	●
Glabal pracessing of mail	●	○	●	◒[3]	◒[4]	○	○	○
Archives and restores messages	●	●	●	○	○	○	○	○
Sarts in-bax by assigned keyward	●	●	●	○	○	○	○	○
Sarts in-bax by any field	○	○	●	○	○	○	○	○
Displays message subset by								
Sender	●	●	●	●	○	○	○	○
Subject	○	●	●	○	○	○	○	○
Date range	●	◒[5]	●	●	○	○	○	○
Text	○	○	●	○	○	○	○	○
Priarity	○	●	●	○	○	○	○	○
Assigned keyward	●	○	●	○	○	○	○	○

The crucial link for most offices is a remote version of the program, so employees working at home or on the road can call in by modem to swap mail. Inter-LAN connectivity is important for larger companies, but only three of the programs exchange mail with other LANs running the same package; at press time only *Higgins* could share schedules across servers. A few packages sell extra-cost gateways to fax, telex, mainframes, and E-mail systems like MCI. Several programs use MHS, a popular "intermediary" utility, to pass mail between dissimilar systems.

	The Coordinator II 2.01	Higgins 2.3	Lotus Notes 1.0	Office Minder 1.02c	Office Works 1.1	Right Hand Man 4.91	Syzygy 1.03	WordPerfect Office 2.0
Scheduling								
Personal calendars	●	●	○	●	●	●	○	●
To-do list	○	●	○	◑[6]	○	●	○	●
Week at a glance	○	●	○	○	●	●	○	○
Month at a glance	○	●	○	●	●	●	○	●
Add notes to appointments	○	●	○	●	●	○	○	●
Warns of conflicts	●	●	○	●	●	○	○	●
Allows conflicts	●	●	○	●	●	●	○	●
Group scheduler	○	●	○	●	●	●	○	●
Message annotation to group schedule	○	●	○	●	●	○	○	●
Resource scheduling	○	●	○	●	○	○	○	●
Suggests conflict-free meeting time	○	●	○	●	●	●	○	●
Meeting response updates personal calendar	○	●	○	●	●	○[7]	○	●
Deletes canceled meetings from personal calendar	○	●	○	●	●	●	○	●
Connectivity								
Remote PC access	●[8]	●[8]	●	○	○	○	○	○
Fax (outgoing)	○	●[8]	○	○	●	○	○	○
Telex (outgoing)	○	●[8]	○	○	●	○	○	○
InterLAN routing	●	●[8]	●	○	○	○	○	○
MHS compatibility	●	●[8]	○	○	○	○	●	○
Remote post office administration	○	○	●	○	○	○	○	○
Personal utilities								
Personal address data base	○	●	●	●	○	●	○	●
Shared address data base	○	○	●	●	●	●	●	●
Auto-dialer	○	●	○	●	●	●	○	●
Calculator	○	●	○	○	○	●	○	●
Communications (modem)	○	○	○	○	○	●	○	○
Expense reporter	○	●	○	○	○	○	○	○
File manager (DOS shell)	◒[9]	○	○	○	○	●	○	●
Flat-file data base	○	○	●	○	○	●	○	●
Gantt chart	○	○	○	○	○	○	●	○
Macros	○	●	○	◒[10]	○	●	○	●

[1] Inflexible selection of addressees.
[2] Copies original message into reply.
[3] Delete through set date only.
[4] Delete and print only.
[5] After specified date only.
[6] Can't prioritize.
[7] Doesn't request attendee response.
[8] Extra-cost option.
[9] Copy, delete, or rename single files only.
[10] Active only in underlying applications.

Scheduling This feature combines private calendars for personal appointments with automated assistance in scheduling group meetings around those appointments. A personal calendar should include daily, weekly, and monthly views and let you add notes to appointments and keep to-do lists. Group scheduling must be straightforward or it won't be used. When you set up a meeting, you should be able to view all your associates' personal calendars in time blocks, but with the details shaded out. A good scheduler suggests free times or at least warns of conflicts. Invi-



The Coordinator automatically tracks all E-mail conversations. Here, an initial "request" is followed by two "counters" and a "promise." If you choose the Agree option when responding to a request or a counter, "I'll do it" is automatically copied into the message body.

Higgins's superb group meeting scheduler lets you view a matrix of the invitees' busy periods. Higgins proposes the first possible meeting time, and you can propose alternate times. After you choose the time, you can add a note to the automatic E-mail message requesting attendance.

tations and confirmations should be tightly integrated with E-mail: If you agree to an E-mail request to attend a meeting, you shouldn't have to update your personal calendar manually. (See the *Higgins* review for a detailed look at a top-notch group scheduler.)

Productivity Tools For added allure, several of these programs include personal productivity utilities à la *PC Tools* or *SideKick*. For instance, address data bases let you look up information quickly; auto-dialers dial your modem from stored phone numbers; file managers provide the directory and file-handling tools of DOS shells like *Xtree*. Most of these features don't match up to those in *SideKick Plus* or *PC Tools Deluxe*, but they're welcome nonetheless.

Finally, you'll need to consider the issues of price and technical support. Price usually depends on the size of your LAN, with entry-level prices ranging from $495 to $1800 per server. A typical—and fair—per-node price is about $80 to $100 for LANs of 20 users or less, and $50 to $80 for larger sites. This pricing is in line with the per-node costs of multiuser data managers and word processors.

Here are the in-depth reviews: All these groupware packages fall short on at least one crucial buying criterion. But despite their limitations, *Higgins*, *Lotus Notes*, and *Office Minder* will prove good values for some offices.

The Coordinator II 2.01

The Coordinator II doesn't so much add to E-mail as reinvent it. Designed to reinforce deadlines and track projects and responsibilities, it divides E-mail into seven types, some of which include canned messages and responses. There's also a personal calendar that reflects date-specific messages. The system works fine if your company is willing to reshape its corporate structure to fit the mold, but most companies won't. Also, there is no group scheduling, and the price is steep: $1800 for 10 users, $3000 for 30, and $75 to $90 per user for larger bundles. Despite a suave interface and some intriguing features, *The Coordinator II* is only a fair value.

The Coordinator II's interface is one of the roundup's best. Easy to learn and use, it provides pulldown menus, pop-up dialog boxes, hot keys, and context-sensitive help. If you're confused by the many message types and options, you can stick to one basic type, but then you miss out on the intended benefits of the program. You can also split your in-box

EXECUTIVE SUMMARY

Groupware: Still a Generation Away

Promising software is hampered by underpowered E-mail and unwieldy interfaces.

Where's the Best Buy? Not here, not now, not yet. But you can still find good values. With its unique text management features and brilliant E-mail, **Lotus Notes** would have been a clear Best Buy if not for Lotus's sky-high pricing. **Higgins** had a shot, with its superb group scheduling and top-notch E-mail, but the awkward interface scuttled its chances. **Office Minder** is the best bargain of the roundup, but like most of these products it could stand improvement, especially with E-mail.

	The Coordinator II 2.01	Higgins 2.3	Lotus Notes 1.0	Office Minder 1.02c	Office Works 1.1	Right Hand Man 4.91	Syzygy 1.03	WordPerfect Office 2.0
Messaging	Good	Good	Excellent	Good	Good	Fair	Poor	Good
Message management	Good	Excellent	Excellent	Fair	Fair	Good	Poor	Poor
Scheduling	Poor	Excellent	n/a	Good	Good	Poor	n/a	Excellent
Connectivity	Good	Excellent	Good	Poor	Fair	Poor	Poor	Poor
Personal utilities	Poor	Good	Good	Fair	Good	Good	Poor	Excellent
Ease of use	Excellent	Poor	Excellent	Good	Fair	Good	Fair	Good
Overall value	Fair	Good	Good	Good	Fair	Fair	Poor	Fair
Reader service no.	685	686	687	688	689	690	691	692

How we rate groupware packages
We rate groupwore based an infarmatian in the Feotures Evoluatian table cambined with our hands-an evaluatian af user benefit and ease af use. E-mail features (messaging and message management) are of prime importance. Persanal and group schedul-ing capabilities are next, fallawed by cannectivity aptions, personal utilities, and ather extros.

Messaging refers ta the camman tools af E-mail communicotions. Ta qualify os Good, o praduct should include distribution lists, corban capies, farword and reply aptians, file ottachments, ASCII impart, and a text editar. To achieve on Excellent rating, a program shauld include at leost three af the fallawing: RAM-resident madules, return receipts, blind carban copies, priarity levels, and the ability to view a message while replying ta it.

Message management applies ta taals far organizing incaming mail. Ta ochieve a Good rating, a program must include E-mail falders. Ta rote on Excellent, a program must also include archiving, moil sarting, ond mail disploy aptions.

Scheduling gives equal weight ta bath persanal and graup scheduling features. Ta win an Excellent, a progrom's persanal scheduler should pravide multiple views and warn af canflicts. Alsa, its graup scheduler shauld suggest free times far meetings based an a review af individual schedules. It shauld also autamaticolly invite attendees via E-mail, tentatively updote all persanal calendars befare canfirmation, and report canfirmatian status to the originotar.

Connectivity refers ta E-mail and scheduling links ta other E-moil systems. Ta eorn an Excellent, a pragram must pravide remate dial-in via modem, the ability ta swap mail between like servers, and campotibility with MHS (a widely used E-mail standord). Fox gateways and gotewoys ta external E-mail services are also importont, thaugh nat as vital.

Personal utilities are defined as the extras that aren't usually tied ta E-mail ar scheduling. To earn an Excellent, a program shauld pravide high-quality versions af at least three af the fallawing: an address data base, a flat-file data manager, a praject autliner, a calculatar, and an expense reparter.

Ease of use rotings derive fram ease af installatian, learning, and daily use. Ta earn an Excellent, a program must affer an intuitively understaad care cancept (nat always camman with graupware) and logically organized menus. It shauld alsa enable yau ta perfarm camman tasks with a minimum af keystrokes and shauld adapt easily ta yaur wark habits.

Overall value cambines the scares far all the abave criteria, given the weights indicated, with an eye taward price and technical suppart.

into several windows, so you can read a message while replying to it. E-mail features offer both public and private mailing lists and global tagging. You can thread back through a series of exchanged messages, which is helpful for tracing responsibilities and retrieving lost information.

For a program that concentrates so heavily on E-mail, however, its gaps in that area loom large. You can't request a return receipt, and you're limited to one attachment per message. You can archive messages to disk, but you can't save mail in folders.

The calendar is weak—essentially, it's just another way to display the E-mail in-box. It lists all messages containing date fields for requested responses, reminders, or completion. You can add appointments to the list, but you only get 27 characters to describe them, and there's no display of time blocks.

The Coordinator II's structured

NOTES LIVES UP TO ITS NOTICES

Eric Bender

The corporate users who stuck with *Lotus Notes* through almost two years of beta testing are highly enthusiastic about the new groupware package. Early users endorse some of Lotus's aggressive claims—for instance, that ordinary users can create applications.

At Arthur Andersen's Advanced Computer Audit Technologies group in Chicago, which exploits computer technology for the giant accounting firm, more than half a dozen *Notes* applications are in everyday use. One application offers personnel profiles, complete with scanned photos. Another application builds summaries for project meetings; it's a handy tool for getting "right to the person who has the information," says Peter Chen, the senior manager responsible for implementing *Notes* at Arthur Andersen. A third application stores hardware inventories. While a conventional data manager could handle this prosaic task, *Notes'* friendly *Windows* interface makes it "simple for any user to get access to this information quickly," according to Chen.

These applications were built in-house, mostly by nonprofessionals. "Every day, somebody will say, 'This would be a great *Lotus Notes* application,'" Chen says. "Often we take people with no computer experience, give them the documentation, and within two weeks they're generating applications that go on line."

Use of *Lotus Notes* at Arthur Andersen hasn't spread beyond the roughly 100 members of the technology group, but the company will look seriously at extending use of the program. "Potentially, we could use *Lotus Notes* as a conferencing tool for auditors at local offices worldwide," Chen suggests.

Manufacturers Hanover Trust in New York City has bought copies of *Notes* for over 2000 users and has built numerous applications. Like Arthur Andersen, the huge bank has found that nonprogrammers can quickly develop applications, leading to better-tailored software, says Pat Sziklai, vice president for information services. She quotes one executive on a crucial *Notes* benefit: "Information that once resided only in an account executive's head is now documented."

New York–based Price Waterhouse, another leading accounting firm, ordered copies of *Notes* for 10,000 users before it even shipped, skipping the customary evaluation process. "We are convinced that *Lotus Notes* can make a dramatic impact on our ability to serve our clients," explains Sheldon Laube, national director of information technology. "*Notes* is a transformational technology."

Eric Bender is PC World's East Coast editor.

messaging is an interesting alternative to standard E-mail. But the program is expensive, and its noncustomizable message types probably won't fit your business. By the time you read this, however, a new version that includes group scheduling should be available.

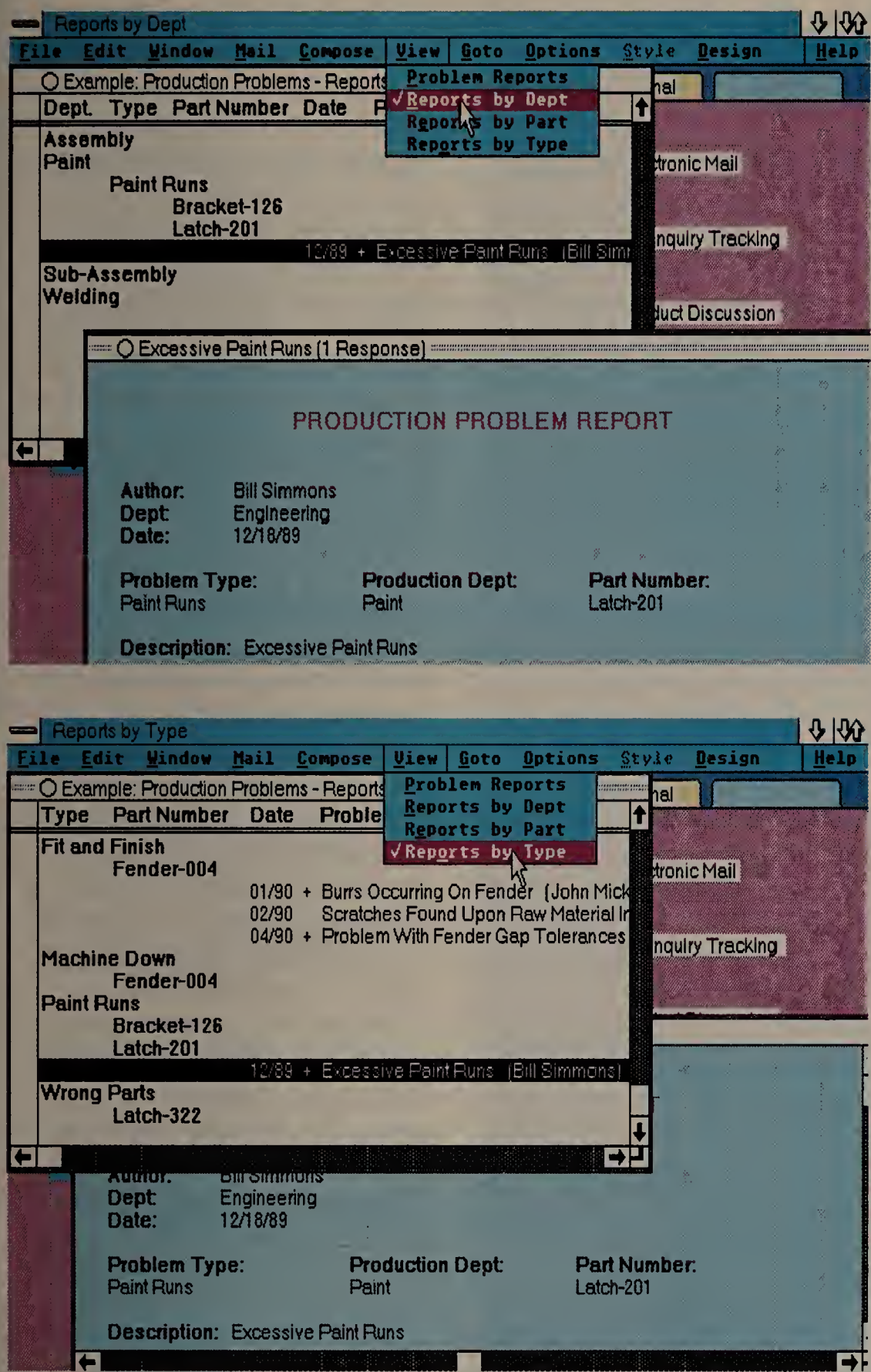
Higgins 2.3

Like *The Coordinator*, *Higgins* is an old-timer, and its maturity is evident in its feature-rich E-mail and the best connectivity options in the roundup. *Higgins*'s E-mail is tightly integrated with personal calendars, an excellent group scheduler, and a slick expense reporter. At $695 for the first eight users, *Higgins* is a bargain for small LANs, but at $75 to $87 per additional user, large LANs pay a premium. Although its awkward interface keeps it from winning an Excellent rating, the program is certainly a good deal.

Higgins's eccentric interface is almost its downfall. Version 2.3 attempts some improvements, streamlining menus and highlighting initial letters, but that's not enough. The *1-2-3*–style menus need consolidation, and their commands are poorly labeled. For example, after you enter appointment details in the calendar, you have to wade through nine prompts to reach the main menu. To look up an address in the data base, you must select six cryptically named menu items in sequence: Schedule, Switch, Extract, Persons, Select, and Directory. Also, command keys are inconsistent, and the seven colors are unpleasant. Despite the context-sensitive help and a printed tutorial, many users will want to sign up for Enable's extra-cost on-site training.

Beneath the uninviting exterior there's plenty of power. Messaging options are very good, and message management is better than most. You get folders and a variety of sort and display options. The one weak E-mail link is the crude text editor.

Scheduling is just as strong as E-mail. You can view your personal cal-



Here are two views of a single Notes problem-tracking data base. The top screen shows a "production problem report" form; behind, a second window shows an overview of the data base, which is organized into a collapsible outline that is then sorted by department. In the lower screen the same data base is outlined by problem type.

endar by day, week, or month, and you can attach notes to appointments. *Higgins* warns you when you try to set conflicting appointments but lets you proceed if you wish. For easy tracking, you can link items from the to-do list or the expense report to scheduled items.

Higgins makes it easy to set up a meeting. Select prospective attendees and resources, and a block matrix of their appointments appears. *Higgins* suggests a tentative meeting time, and lets you add two alternative times. Then it sends an E-mail message to all invitees and marks their calendars with tentative times. Recipients check off the times they're available, attaching notes if desired. *Higgins* collates the responses for the originator, who determines the best time and tells *Higgins* to notify the participants and update their calendars. If necessary, you can preempt this give-and-take and force meetings. If you cancel a meeting, *Higgins* notifies attendees and removes the appointment from their calendars.

Higgins's superb expense-report utility is unique to the roundup. Its thorough forms will keep the IRS happy and can even calculate mileage expenses. You can define up to ten categories; allocate costs by project, client, or other fields; and print out detailed reports.

Higgins tightly integrates its address data base with E-mail folders. You can attach E-mail, appointment, or to-do–list items to data base records, thereby organizing your data by person, project, and other categories.

Connectivity options are tops. Extra-cost options let remote users and other *Higgins* servers exchange E-mail and even schedule appointments via modem or LAN bridge. You can also send faxes, swap mail with mainframes running PROFS or SNADS E-mail, or reach any MHS-compatible system.

Higgins's tedious interface keeps it from winning a Best Buy, but if you need top-notch E-mail tightly linked with scheduling, it's the best game in town. Just remember to add the cost of training when budgeting your journey into the *Higgins* zone.

Lotus Notes 1.0

The hype is right: *Lotus Notes* is what groupware ought to be. It breaks new ground in letting users personally manage group information. If not for its high price, it would win a Best Buy. Still, *Notes* is recommended for large, well-financed departments that need custom E-mail and multiuser text applications but don't require scheduling.

Notes is essentially a text-oriented data base that seamlessly combines E-mail, word processing, conferencing,

and more. The graphical *Windows/* Presentation Manager interface and extensive file conversion capability let you integrate *Notes* with your existing applications. Best of all, *Notes* is easily customizable, so even nonprogrammers can create applications from scratch.

Like *1-2-3, Notes* is so open-ended that the list of possible applications is endless. With its hypertext tools, it's perfect for organizing frequently updated reference materials such as government regulations or airline timetables. It's also suited for shaping and recording ongoing discussions, tracking document revisions, annotating drafts, and rolling up multiple-author reports in a corporate hierarchy. (See the sidebar "Notes Lives Up to Its Notices" for more on *Notes* applications.)

There's just one catch—*Notes* is available only in extra-extra-large: 200 users for $62,500, or over $300 per user at its most affordable. And you won't find any retail discounts, as Lotus only sells *Notes* directly. What's more, *Notes* requires a dedicated 386 server running OS/2 with at least 6MB of RAM and 30MB of free disk space. On the plus side, that price includes dial-in access for remote users, interserver message transfer, five days of on-site installation and customization, and six months' toll-free technical support—and the 200 users can be spread over multiple servers and LANs at no extra charge.

Notes doesn't follow the usual *Windows/* PM rules—for instance, the command keys are different, and you expand a window by double-clicking on the top bar and close it by clicking in a round window in the upper left corner. Lotus promises a standard interface option in the next release. Fortunately, there's excellent context-sensitive help, and you can leave *Notes* resident while you work in another program.

Creating a *Notes* application is much simpler than Lotus's cautious, hand-holding sales approach suggests—it doesn't feel like programming at all. Using tools similar to those found in forms programs like Bloc Publishing's *FormFiller*, you design templates for *Notes* documents, which can be data base records or reports, E-mail messages, or word processing files. You paste entry fields for text, date, number, or "rich text" (including fonts and graphics) onto a blank screen, and you create and edit *Notes* documents with a built-in graphical word processor that's similar to *Windows Write*.

Notes' text-management tools are somewhat similar to *Agenda*'s, but they're much easier to use. To manipulate a *Notes* data base, you define views that let you sort the information into hierarchical, collapsible outlines. You also create filters that select documents based on similar criteria. For instance,

COMING SOON: ICONS FOR ORGANIZATIONS

Eric Brown

New groupware packages are popping up all the time. Two promising entries offer graphical interfaces. Too late for review, *Finalsoft Synchrony* should be available by the time you read this, but *Together* won't ship until late 1990 or early 1991.

***Finalsoft Synchrony* is a *Windows*-based package that adds document revision features to the groupware mix. This eases group editing by letting you electronically redline documents and add comments. You can also add hypertext links to group documents, enabling you to open a nested document or comment by clicking on highlighted text. More typical groupware features include MHS-based E-mail, conversation and project tracking, a to-do list, a word processor, and personal and group schedulers.**

***Together*, an ambitious, object-oriented OS/2-Presentation Manager package, is intended as a multiuser environment shell from which you can launch PM programs and interact with a work group. It provides E-mail and document revision features but lacks scheduling options. Using icons and color coding to represent different tasks, documents, and work groups, *Together* launches an associated PM program when you click on a document. Drag the icon onto the Conference Table icon, and a copy is sent to each person in the associated work group. "Smart" E-mail takes on a life of its own: You can send a draft document to the work group, specifying a set amount of time for each user to attach comments. When the deadline arrives, *Together* automatically retrieves all the notes, collates them with the draft, and sends the collated document to the originator or the entire group.**

WHERE TO BUY

Finalsoft Synchrony
Finalsoft Corp.
Atrium Office Park
3900 N.W. 79th Ave. #215
Miami, FL 33166-9791
305/477-2703
LIST PRICE: 6 users $445, 10 users $695, unlimited users $1995
Reader service no. 697

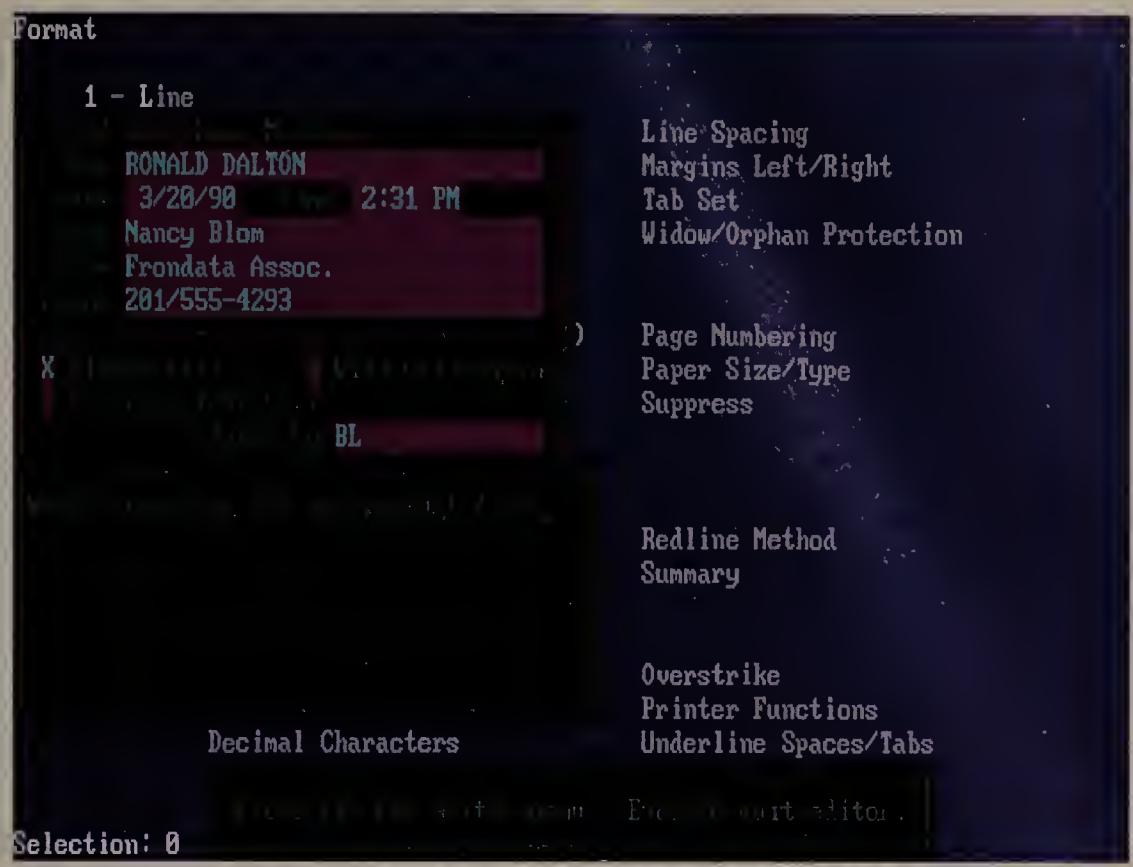
Together
Coordination Technology, Inc.
35 Corporate Dr.
Trumbull, CT 06611
203/268-4045
LIST PRICE: unavailable
Reader service no. 698

you can easily create a view of your E-mail in-box (which is just another data base) to categorize mail by project and subject. Click on a project, and an indented list of topics appears below it; click on a topic, and it displays a list of related messages. Field, view, and filter definitions can include formulas based on *1-2-3*–like @ functions for added power.

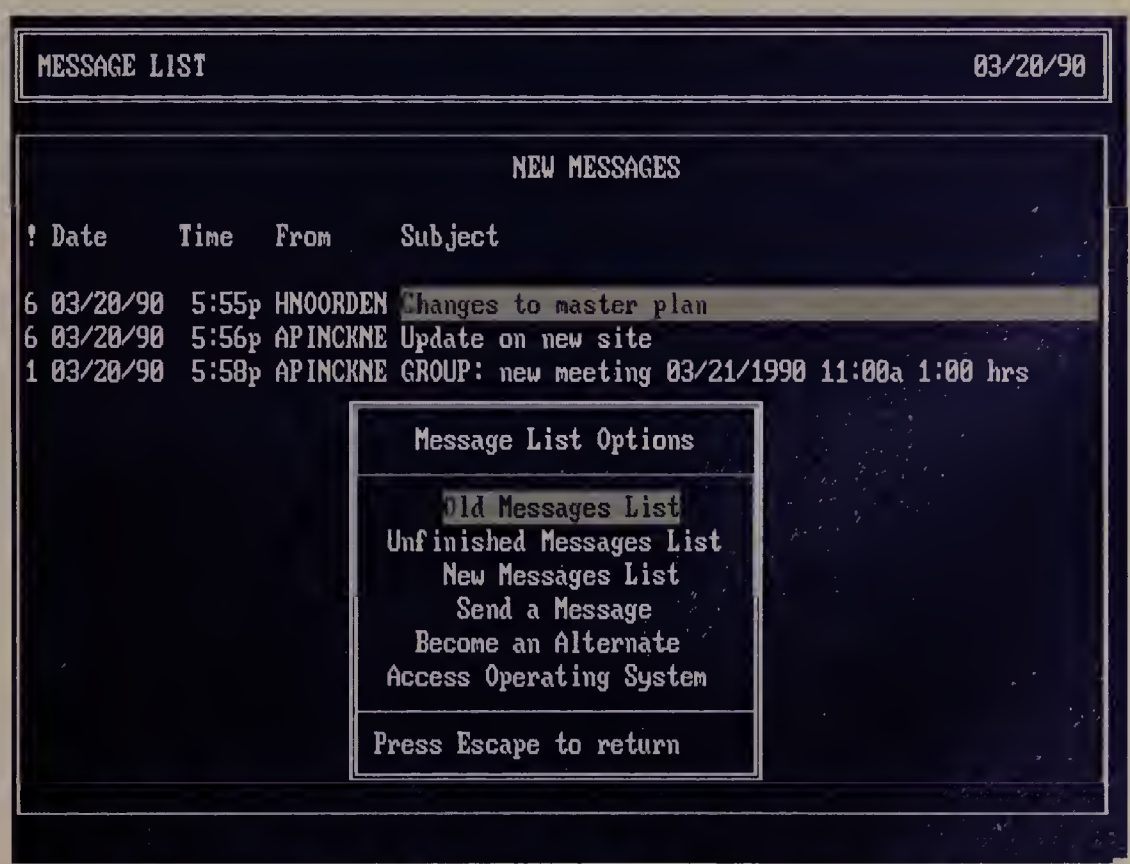
Yet *Notes* is much more than a multi-user personal information manager (PIM)—its customizable E-mail almost equals top E-mail–only programs. It's the only package reviewed that offers bulletin boards and blind carbon copies, and it's one of the few that provide folders. Its only flaw is serious: You can't pick addressees from a list.

You can format mail with *Notes*' word processor or import formatted files, including graphics. You can even set up hypertext links to jump to a point in another document or data base.

Notes is an extraordinary product—it's powerful, very flexible, and easy to use. If your company is big enough to afford the 200-pack, check it out.



You can pop up Office Minder's memory-resident telephone message utility without exiting your current application (here, WordPerfect). (You can pop up the full program as well.)



Office Works' in-box listing is bare bones but functional. In-boxes in most other programs display senders' full names instead of just their log-ins.

Office Minder 1.02c

A new kid on the groupware block, the RAM-resident *Office Minder* combines competent E-mail, excellent group scheduling, and a useful address data base. It tosses in an oddball project outliner that doesn't quite hit the mark, but doesn't get in the way either. Unless you require connectivity options, the easy-to-use *Office Minder* is well worth the low $695-per-server price.

Except for its pulldown main menu, *Office Minder* follows the *1-2-3* top-line interface, with additional tasks summoning overlapping pop-ups. The interface is easy to master, but some actions demand excessive button pushing—attaching a file requires at least eight keystrokes. RAM-resident options are flexible: You can pop up the entire program in 88K, load a mail-only 56K TSR, or load a 4K notification TSR.

Messaging options cover the make-or-break basics. *Office Minder* lacks folders and archiving, but it lets you display a subset of messages by date range and sender. The text editor is superior, and you can cut text from the underlying application's display and paste it into the editor.

Scheduling features are respectable but don't match those of *Higgins*. When you receive a meeting request, you have to update your calendar manually; fortunately, it's but a keystroke away. The personal calendar is capable, but you can't prioritize items.

Like *Syzygy*, *Office Minder* adds a dash of project management to the

groupware mix. A special project outliner allows you to break down a project into dated goals and nested subgoals and to delegate tasks to various *Office Minder* users. It's easy to send messages to those responsible for a given task. Unfortunately, the outliner interface is clumsy: To reach a subgoal you must open numerous overlapping windows. A tree structure would be better.

The address data base is superior. Everyone can add or edit shared entries. Private contacts appear on the same list, but others can't view them.

Office Minder has some gaps and rough edges, but it's a first-rate value. The best bet for bargain hunters.

Syzygy's rigid project-scheduling model relies on nested windows showing "tasks," "projects," and "objectives." Here, the front window lists tasks for the "Institute quality control program" project of the "Manufacturing projects" objective. To view dates and budget figures for these tasks, you would have to switch to two separate windows.

Office Works 1.1

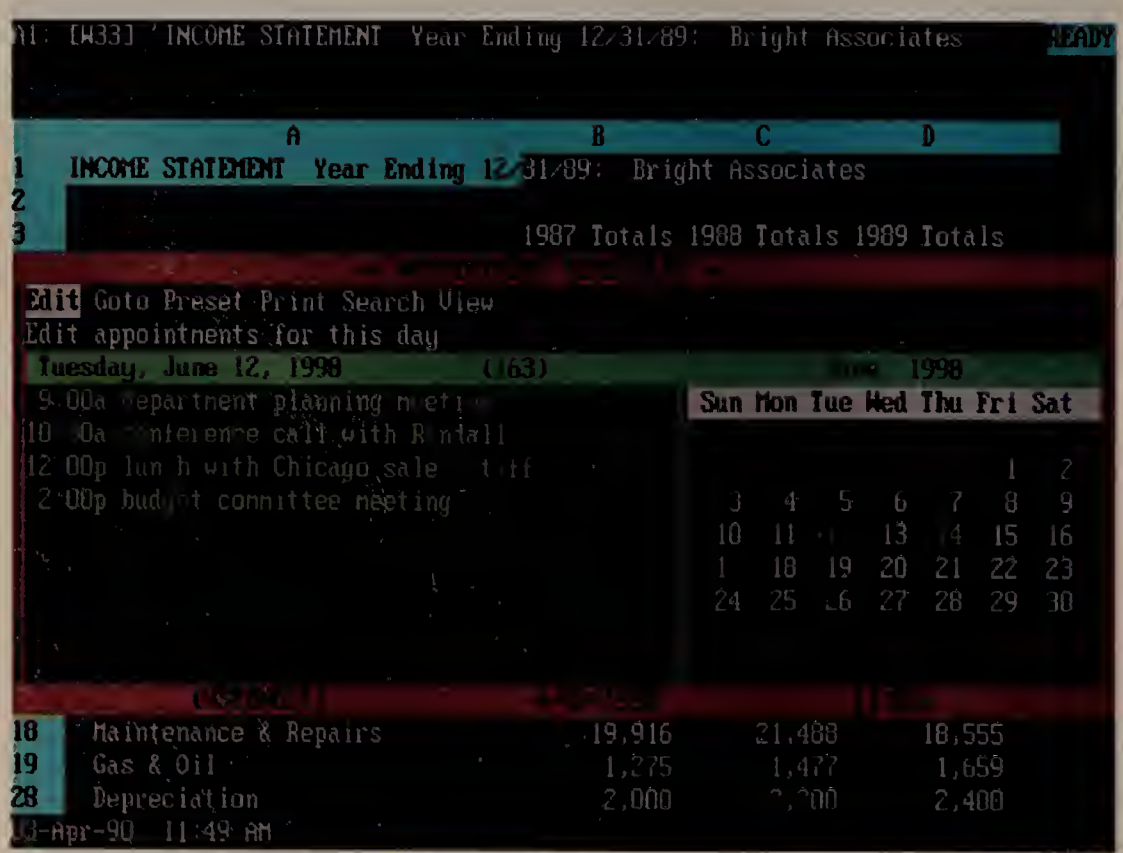
Office Works' E-mail, personal calendar, and group scheduler are all solid, and at $495 for 6 users, $895 for 20, $1395 for 50, and $1995 for unlimited users, it's relatively cheap for smaller LANs. However, the modules aren't as tightly integrated as in *Higgins*, and a keystroke-hungry, unintuitive interface gets in the way. All told, *Office Works* is only a fair value.

Office Works' interface is merely adequate. You navigate pop-up menus with the cursor keys or initial letters. Command-key assignments are often odd: <Tab> starts a search, <F7> pops up menus, and sometimes the <Space> bar backs you out of a menu. Fortunately, there's good context-sensitive help and an interactive tutorial.

Office Works' E-mail power is passable. You can save drafts and view a message while replying, and you can set up to nine priority levels. However, the editor is primitive and message management is weak: There are no folders, archiving, or sorting options. You can move messages into a "document control" data base that provides some of those capabilities and even lets you track external files—but its keystroke-happy interface is tough to master.

The personal calendar is as good as *Office Minder's*, and it even provides a week-at-a-glance view. Group scheduling is weaker. For example, you can't jump straight from the E-mail meeting request to the calendar. The shared address data base is excellent. You can separate company and individual addresses for easy updating. However, you can't set up cross-references to E-mail folders as in *Higgins*.

Office Works is average in almost every way. But look for upcoming version 2.0 to add some pizzazz.



Loading Right Hand Man memory resident lets you use any of its utilities without interrupting your work. Here, its daily calendar is displayed over a 1-2-3 session.

Right Hand Man 4.91

Right Hand Man resembles a *SideKick* forced into the role of a LAN E-mail package. It's chock-full of productivity utilities, including a pop-up calculator, a notepad, a modem communications program, an address data base, an autodialer, and even an *Xtree*-like DOS file manager. By using expanded or extended memory or swapping to disk, the program can run as a RAM-resident pop-up in only 6K. Unfortunately, *Right Hand Man* lacks essential E-mail features, and its scheduling system is awkward. It's recommended only if you need pop-up messaging but can't afford to sacrifice much RAM. Wait for version 5.0, a major upgrade.

Right Hand Man itself is fairly easy to use. Mostly, you navigate the menus with the <Space> bar, and there's terse context-sensitive help. One big plus: You can open two utilities in separate windows and switch back and forth. Also, you can set up macros to automate underlying applications.

E-mail is substandard. You're limited to one attachment per file, and you don't get mailing lists, carbon copies, or an automatic reply feature. The primitive text editor won't let you import a text file; instead, you have to load the file into the separate file editor, copy it to *Right Hand Man*'s clipboard, switch to the mail utility, and paste the file into your message. There's also a split-screen "chat" feature that lets up to five users type messages to each other in real time. *Right Hand Man* lacks tagging, sorting, and archiving, but it's one of the few programs with folders.

The personal calendar is pretty good, with daily, two-week, and monthly views, but there's no warning message when you set overlapping appointments. The group scheduler is fairly primitive—you have to send associated E-mail notices manually. Also, unless the organizer's name is in the meeting description, you can't tell who set the meeting.

Adding groupware features to a desktop organizer makes sense, but most of *Right Hand Man*'s utilities, such as the calculator, are unexceptional. The DOS file manager lets you move, copy, delete, and rename files, change attributes, globally tag files, and sort directories, but there's no tree display, two-directory split screen, or formatted-file viewer. The modem communications module lets you swap text with the E-mail module using the clipboard, but protocol support is limited to XMODEM, and it lacks a script facility. The address data base is pretty good, and if you don't like it, you can quickly whip out a new one using the simple flat-file manager.

Right Hand Man is in no-man's-land. It's no match for desktop leaders like *PC Tools Deluxe* or *SideKick Plus*, and its groupware features can't match those of *Office Minder* or *Higgins*.

IMPENDING UPGRADES

Groupware vendors never rest—five of the products in this review have upgrades in the works. Here's a brief preview:

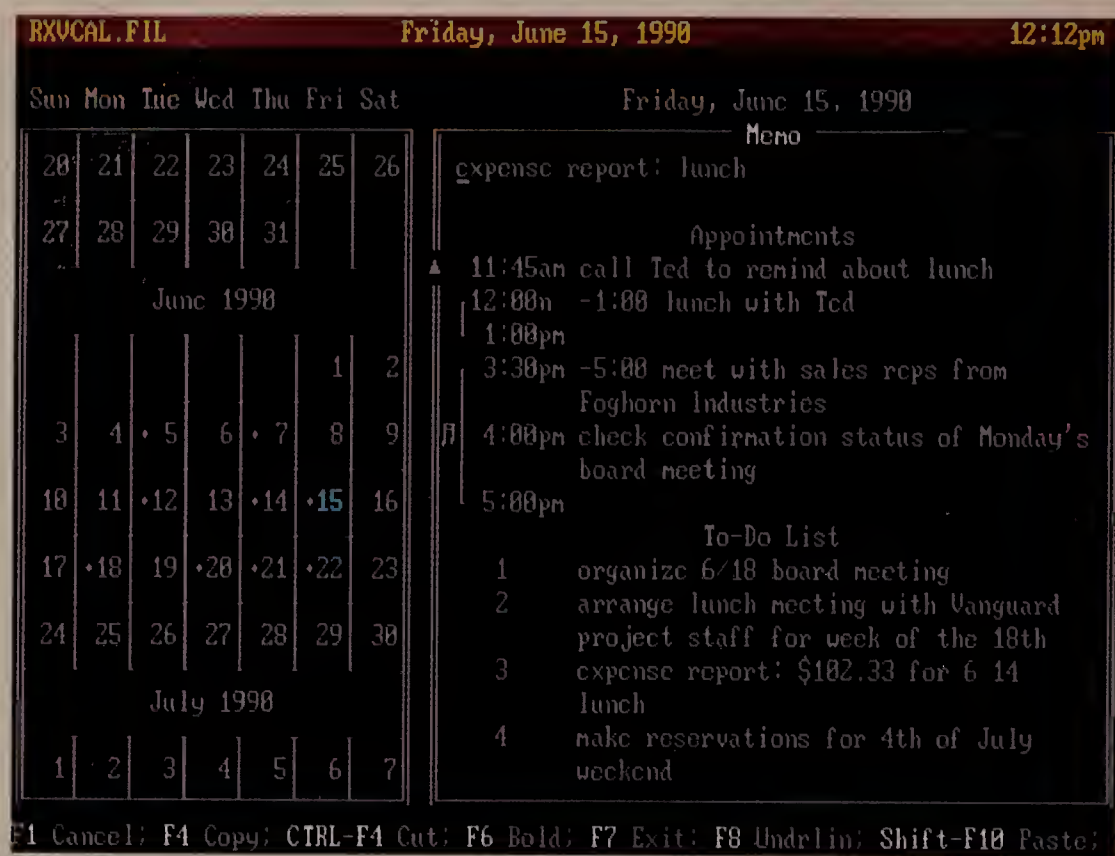
***The Coordinator II 2.1* will add group and resource scheduling similar to *Higgins*'s. The scheduler will also be available via the dial-in utility and across multiple *Coordinator* servers via MHS. Announced ship date: April 1990.**

***Office Minder 1.03* will add MHS support. Also, an administrative utility will canvass NetWare for all listed users and groups and add them to *Office Minder*'s user lists. Announced ship date: May 1990.**

***Office Works 2.0* will run memory resident in 40K via a shell that lets you hot-key between up to 19 applications. You can also set up macros to switch between applications. A $695 option will let you share mail and schedules between *Office Works* servers. Announced ship date: March 1990.**

***Right Hand Man 5.0* will add mailing lists, in-box sorting, MHS support, and multiple file attachments. You'll be able to attach notes to appointments, and the group scheduler will automatically send E-mail invitations. Version 5.0 will also offer NetWare printer support, letting users manage print queues without exiting their applications. Announced ship date: April 1990.**

WordPerfect Office 3.0* will offer a wide range of enhancements. The text editor will be improved, and you'll be able to send regular and blind carbon copies, set mail priorities, and password-encrypt individual messages. The scheduler will be more tightly integrated with E-mail, and you'll also get a TSR manager and advanced macro programming. The file manager will add a split-screen interface, tree display, and program launching via file extensions. A $695 option will extend E-mail and scheduling over multiple servers, and an MHS gateway will be available for $995. The new tiered pricing scheme will make *Office* about a third less expensive. Announced ship date: June 1990. —*R. L.



WordPerfect Office's personal calendar is divided into four scrollable windows displaying memos, appointments, a to-do list, and a view of the month. The pointer at the top left of the Appointments window shows that there are additional events scheduled earlier in the day.

Syzygy 1.03

Syzygy is intended to schedule and budget projects and assign and track tasks. It's not a full-fledged, critical path project manager like *TimeLine*, but it offers project-tracking tools such as Gantt charts. Although it's an interesting concept, the implementation is flawed: E-mail features are primitive, you can't edit calendars directly, there's no group scheduling, and it's expensive ($695 per server, plus $150 per workstation). All told, it's a poor value.

The character-based interface mimics a graphical look with lines, boxes, and shadows, but there's no mouse support. You navigate menus with function or cursor keys. There are far too many menus, and many operations are awkward. For instance, when you highlight a user on the phone-list menu you can't just press <Enter> for more information—instead, you must press <Shift>-<F2> and select the Information form option.

Syzygy breaks projects down into three levels. At the top are objectives, which contain a number of projects, which in turn hold tasks—usually to-do items or appointments. You can rename these terms to reflect your business—in a law firm, for instance, "projects" could become "clients" and "tasks" could be renamed "cases." In addition, there's a separate "resources" file (also renamable) that contains information about users but could also cover outside contacts or even shared equipment.

Task records are the building blocks for scheduling projects. Each task can include a 40-character description, a due date, a time, a completion date, and up to four interim milestone dates. You can also add an hourly rate, a text note, and budgeted, revised, and actual dollars or hours. Another attachment is a "responsibility form," which specifies the person who has primary responsibility for a task and three people who are to be notified, consulted, or asked for approval. Unfortunately, task info is scattered over half a dozen screens.

Syzygy's E-mail is the worst in the roundup. You can address a message to only one person, and you can't select an ad hoc list for carbon copies—copies go to either everyone on the responsibility list or everyone in the work group. You can't import or attach files, or reply to or forward a message, and there are no distribution lists or folders. You can view tasks that you're responsibile for as a to-do list or a calendar, but you can't set up a personal calendar.

Syzygy's intended use is unclear. It may be the ticket for scheduling and tracking complex, repetitive tasks: Executive secretaries at a large bank use it to keep board meetings on track, and a government contractor uses it to track compliance with regulations. But *Syzygy* fails as an everyday communications medium.

WordPerfect Office 2.0

WordPerfect Office excels at group scheduling, and it's rich in productivity utilities. But with its moribund E-mail and its expensive pricing scheme—$495 for the first workstation and $150 each for the rest—the current version is only a fair value. Fortunately, version 3.0, due this summer, looks more promising.

WordPerfect users will feel right at home with *Office*'s efficient, function key–driven interface. Active keys are displayed on screen, and a keyboard template is included. The context-sensitive help is excellent. The program can run memory resident if you launch applications from its menu shell.

Office's E-mail is average (you can't send carbon copies), and message management is very weak: It provides no folders, group tagging, archiving, or message sorting. The text editor won't let you save drafts, but you can import *WordPerfect* files into messages, preserving bold and underlined text.

The calendar is excellent. When you set overlapping appointments, they're displayed graphically. The superb group scheduler is second only to *Higgins*'s. The meeting organizer sees the usual chart of available times and can set a conflicting time. When you open your personal calendar, the tentative appointment appears and prompts you to accept or reject it. Unfortunately, to find

out who set up the meeting you have to switch to the group scheduler—but once there you can confirm or decline.

The other modules included in *WordPerfect Office* are useful but still don't justify its high price. The DOS shell lets you hot-key between applications, move data between them, and create macros that perform operations across several programs. A flat-file manager includes an auto-dialer and lets users share data bases. There's also a sophisticated calculator and a program editor.

WordPerfect Office is powerful and easy to use, but it has too many gaps for its high price; wait for version 3.0.

Wait and See

None of the products reviewed rated a Best Buy. *Lotus Notes* is exceptional, but its pricing strategy excludes all but the largest LANs. If you want sophisticated E-mail combined with group scheduling, *Higgins* may be the answer, but test-drive the awkward interface before you buy. If you're looking for a bargain, *Office Minder* is your best bet.

Groupware, although beginning to show promise, has yet to reach its golden age. Many buyers will adopt a wait-and-see attitude toward this fast-changing category.

Robert Lauriston is an associate editor for PC World.

For more information about all products in this article, circle reader service no. 907.

WHERE TO BUY

The Coordinator II 2.01
Action Technologies
2200 Powell St., 11th fl.
Emeryville, CA 94608
800/624-2162, 415/654-4444
LIST PRICE: 10 users $1800, 30 users $3000, 50 users $4500, 100 users $7500; single-user version $600
REQUIREMENTS: 384K; DOS 3.1 or later version; NetWare 2.1 or later version, or IBM's PC LAN
TECHNICAL SUPPORT: toll-free number, M–F 6–5:30
OTHER SUPPORT: E-mail via MHS, newsletter, user group
Reader service no. 685

Higgins 2.3
Enable Software Inc.
1150 Marina Village Pkwy. #101
Alameda, CA 94501
800/888-0684
LIST PRICE: 8 users $695, additional users $349 for 4, $995 for 12, $1495 for 20; Higgins Exchange version 1.2 (required for the following products) $695; Higgins Remote $395; Higgins To:Fax $995, Higgins To:MHS $495, Higgins To:PROFS $2995
REQUIREMENTS: 270K; DOS 3.1 or later version; NetWare, 3Com 3+Share or 3+Open, or Banyan VINES
TECHNICAL SUPPORT: toll-free number, M–F 7–5
OTHER SUPPORT: BBS, user group, newsletter, training
Reader service no. 686

Lotus Notes 1.0
Lotus Development
55 Cambridge Pkwy.
Cambridge, MA 02142
800/327-6148, 617/577-8500
LIST PRICE: 200 licenses $62,500, each additional license $295
REQUIREMENTS: 640K (4MB for OS/2); DOS 3.1 or later version; either Windows 2.1 or later version (Windows runtime included) or else OS/2 1.1 or later version; NetWare 2.15, IBM's PC LAN 1.2 or 3Com, 3+Share 1.3.1 or 3+Open. Server: 386 system, 5MB of RAM, hard disk, OS/2 1.1 or later version
TECHNICAL SUPPORT: toll-free number, M–F 9–5
OTHER SUPPORT: five days on-site installation and consulting
Reader service no. 687

Office Minder 1.02c
Advanced Concepts
4129 N. Port Washington Ave.
Milwaukee, WI 53212-1029
800/222-6736, 414/963-0999
LIST PRICE: $695 per file server
REQUIREMENTS: 86K; DOS 3.0 or later version; NetWare 2.0 or later version, 3Com 3+Share or 3+Open, Banyan VINES, or IBM's PC LAN
TECHNICAL SUPPORT: toll number, M–F 9–5:30
OTHER SUPPORT: BBS
Reader service no. 688

Office Works 1.1
Data Access Corp.
14000 S.W. 119th Ave.
Miami, FL 33186
800/451-3539, 305/238-0012
LIST PRICE: 6 users $495, 20 users $895, 21 to 50 users $1395, unlimited $1995; single-user remote dial-in $195; inter-LAN routing $695
REQUIREMENTS: 400K; DOS 3.1 or later version; NetWare 2.0 or later version, 3Com 3+Share 1.3.1, IBM's PC LAN 1.31, Banyan VINES, or any NETBIOS-compatible NOS
TECHNICAL SUPPORT: toll number, M–F 9– 5:30
OTHER SUPPORT: none
Reader service no. 689

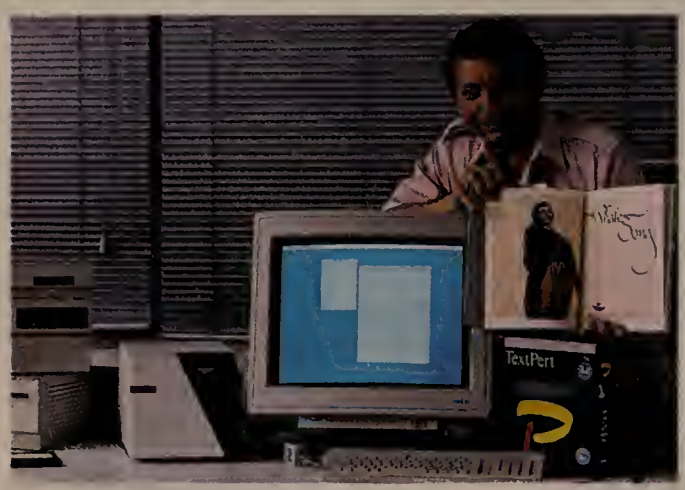
Right Hand Man 4.91
Futuresoft, Inc.
3131 N. I-10 Service Rd. #401
Metairie, LA 70002
800/327-8296, 504/837-1554
LIST PRICE: 5 users $495, 10 users $899, 15 users $1275, 25 users $1875, 50 users $3500, 100 users $6500
REQUIREMENTS: 64K; DOS 3.1 or later version; NetWare 2.1 or later version, Banyan VINES, 3Com 3+Share or 3+Open, or IBM's PC LAN
TECHNICAL SUPPORT: toll number, M–F 9–5
OTHER SUPPORT: BBS, MCI Mail
Reader service no. 690

Syzygy 1.03
Information Research Corp.
414 E. Market St.
Charlottesville, VA 22901
800/368-3542, 804/979-8191
LIST PRICE: $695 per server, plus $150 per workstation
REQUIREMENTS: 512K; DOS 3.1 or later version; NetWare 2.1 or later version, Banyan VINES, 3Com 3+Share or 3+Open, or any NETBIOS-compatible NOS
TECHNICAL SUPPORT: toll-free number, M–F 8–5
OTHER SUPPORT: BBS, newsletter, training
Reader service no. 691

WordPerfect Office 2.0
WordPerfect Corp.
1555 N. Technology Way
Orem, UT 84057
800/843-4304, 801/225-5000
LIST PRICE: $495, each additional user $150
REQUIREMENTS: 512K; DOS 3.0 or later version; NetWare 2.12 or later version, 3Com 3+Open, Banyan VINES, IBM's PC LAN, AT&T Starlan, DCA 10Net, Artisoft LANtastic, DEC PCSA, or TOPS
TECHNICAL SUPPORT: toll-free number, M–F 7 a.m.–6 p.m.; toll number, M–F 6 p.m.–7 a.m.
OTHER SUPPORT: newsletter, BBS, CompuServe and GEnie forums, user group
Reader service no. 692

TextPert reduces your data entry costs

Award winning photographer and publisher, Robert Goodman has created several books using traditional methods. Although his books were award winners... "The bad news", says Goodman, " arrived daily with high bills for typesetting, design, paste–ups..., the list seemed endless".



By using TextPert™ in creating **Whale Song**, Goodman saved valuable time and money without compromising on quality.

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Circle 53 on reader service card

The First 486s: Great Expectations Unfulfilled

New 486 systems from IBM, AST, and NCR go head-to-head with the fastest 386s around—and can't keep up.

Eric Knorr

From a distance, the ascent from 386 to 486 performance seemed heady enough. But testing three of the first 486 systems on the market brought us back down to earth.

IBM must have been wishing hard when it claimed that its debut 486 system would be "up to twice as fast as 33-MHz 386 systems—even those equipped with a math coprocessor." When we benchmarked the PS/2 Model 70 486 against the Compaq Deskpro 386/33 (the machine IBM kicked around in its 486/25 Power Platform demo a year ago), the best IBM's unit could muster in any one test was a 21 percent lead. In fact, results for data base tests (which exercise a system's hard disk) show the Model 70 486's performance to be 12 percent slower under DOS and 77 percent slower under OS/2 than the Deskpro (due in part to the superior performance of Compaq's OS/2).

The AST Premium 486/25 ISA is the only system reviewed that can hold enough drives to fill a work group's mass storage needs. It's also the least expensive unit by far.

The two other 486 machines reviewed here, the AST Premium 486/25 ISA and the NCR PC486/MC, fared better against the Deskpro 386/33 in the DOS tests. But in the OS/2 tests they did worse, particularly the Premium 486/25 ISA, which was 30 to 40 percent slower than the Deskpro.

One factor in these stunning defeats must have been Compaq's OS/2, which time and again has proven itself to be the fastest available. And certainly the Deskpro's ultrafast hard disk and special caching software played a role. But the point is that if you've got a 33-MHz 386, buying a 25-MHz 486 system won't guarantee a jump in performance.

Prices only dimly reflect performance realities. Try configuring both the Model 70 486 and the Deskpro 386/33 with 4MB RAM, VGA monitors, and their smallest hard disks (60MB for the Model 70; 84MB for the Deskpro). Add a 33-MHz 80387 coprocessor to Compaq's unit to match the 387 capability that 486s have on chip (see the sidebar "The 486 Raises the Platform"), throw in DOS with both systems, and the Deskpro 386/33 costs $12,917—about $1600 less than the Model 70 486.

Neither IBM nor NCR offers a 33-MHz 386. AST does, and its recent additions of free RAM to the Premium 486/25 ISA's base configuration seem to acknowledge the slim performance margin between its two systems. Configure both AST units with 4MB RAM, a 110MB hard disk, VGA graphics, and DOS (the configuration applied to all

MARC SIMON

IBM's unit has the highest price and the lowest capacity for fast RAM. The PS/2 Model 70 486 is also the slowest DOS unit—but, surprisingly, the fastest 486-based OS/2 machine.

systems here), add $994 to the 386/33 for the 387, and at $11,114 the Premium 486/25 ISA costs only $435 dollars more. In that same configuration, except with a 100MB hard disk, NCR's PC486/MC comes in at a walloping $14,389.

The Model 70 486 and the PC486/MC have something in common besides high price: Micro Channel architecture, which promises higher throughput and greater reliability than you'll get from

WHAT MAKES THE 486 RUN?

You probably already know about the speed and compatibility benefits of Intel's 486. Run a 386 and a 486 at the same 25-MHz clock rate, and the 486 will execute instructions between 40 and 50 percent faster. Take any of today's high-powered software designed specifically for the 386—say, *Paradox/386* or the 386-specific version of *AutoCAD*—and it will run like blazes on the 486 without compatibility problems.

But the 486 is more than just a fast 386. Intel has loaded the 486 with features that promise two long-term benefits: better software and superior performance for less money.

A Whiz at Math

Along with its revved-up 386 engine, the 486 contains circuitry that emulates Intel's 387 math coprocessor. As 486s proliferate, CAD and spreadsheet programs won't be the only applications that recommend a math coprocessor. For example, future desktop publishing packages could use the number crunching for global kerning and reformatting, while an increasing number of data management programs may use the coprocessor to relieve the CPU of burdensome numeric operations.

When software developers can assume 387 capability, the result will be better performance for many types of applications. And if you own a 486, you won't have to shell out for an expensive math coprocessor—it's built in.

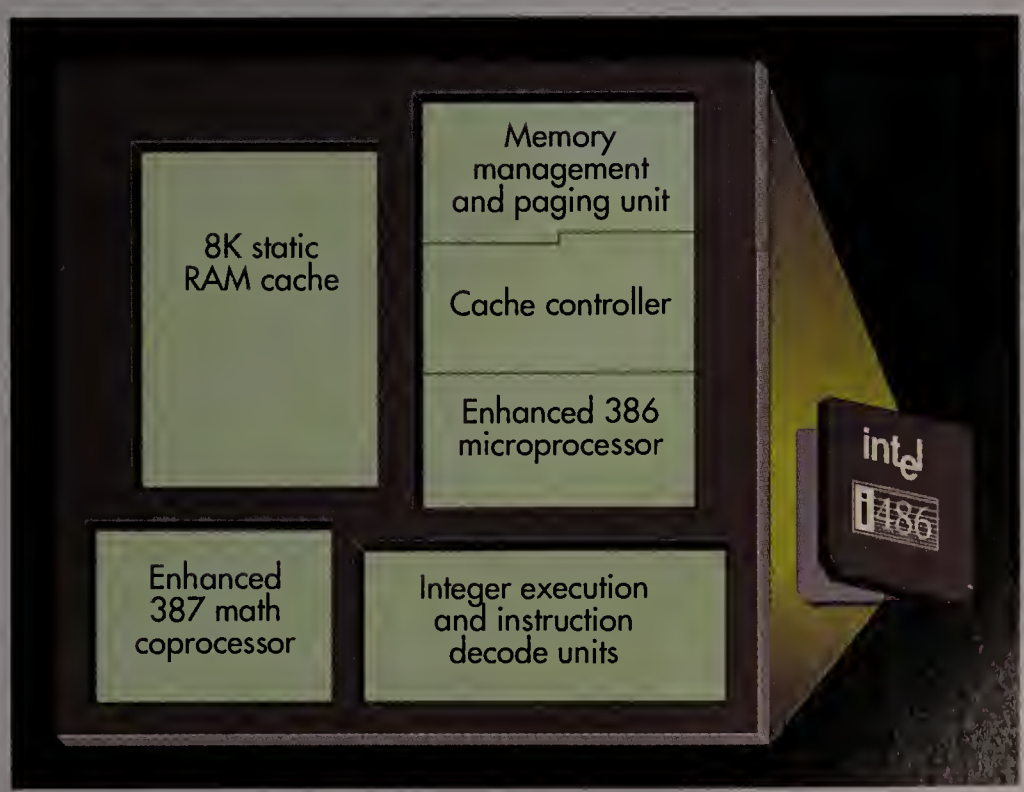
The Chip With a Memory

The 486 has other tricks up its sleeve, including an 8K *memory cache* and a *cache controller*. To get top performance—that is, to avoid *wait states* that cause the CPU to waste processing cycles—systems running at 25 MHz or faster generally use a cache of very fast memory. The cache holds the most frequently used data from main memory, while the cache controller ensures that data in the cache and data in main memory are consistent.

In a 386, both the cache and the cache controller (usually an Intel 82385) are separate, rather expensive components on the motherboard. Often, a 32K memory cache in four 8K static RAM chips provides speed benefits equivalent to the 486's 8K on-chip cache. Together these components cost roughly the same as the 486, but you get better performance at the same clock speed.

As with any new technology, the 486 systems in this review cost a bundle. However, the reduced component count—along with fewer leads and sockets on the motherboard—suggests that once production gets going, it may not be long before the 486 is the most cost-effective high-performance solution. An abundance of coprocessor-aware software will be only one of many benefits. —*E. K.*

Inside Intel's 486



The 486 chip consolidates a 386-compatible CPU, a memory cache, a cache controller, and a 387-compatible math coprocessor on a single chip.

FEATURES EVALUATION

Future Business Workstations

The more CPU-speed RAM a system can hold, the better it can tap the blazing speed of the 486 processor to tame complex applications. With a whopping 36MB capacity, AST's Premium 486/25 ISA has the most CPU-speed-RAM headroom.

● Yes ○ No
◒ Deficient

	AST Premium 486/25 ISA	IBM PS/2 Model 70 486	NCR PC486/MC
Standard features			
List price [1]	$11,114	$15,133 [2]	$14,389 [3]
Capracessar support	Weitek 4167 [4]	nane [4]	nane [4]
Disk caching saftware	●	●	○
Built into matherbaard			
Parallel port	●	●	●
Serial part	● [5]	●	●
Floppy disk contraller	●	●	●
Hard disk cantraller	●	●	○
Mause part	○	●	●
CPU-speed RAM [6]			
Capacity	36MB	8MB	16MB
Expandability			
32-bit slats/number free	3/2 [7]	2/2	3/2
8/16-bit slots/number free	3/2	1/1	4/2
8-bit slots/number free	1/1	0	n/a
Half/full-height bays	5/2	3/1	3/1
300MB ar larger hard disk available from manufacturer	●	●	○
Design			
Switchless setup	● [8]	●	●
Campact faatprint	○	●	●
Camplete dacumentation	●	●	●
Tilt-and-swivel manitar	●	●	●
Frant-panel an/aff switch	○	●	●
Frant-panel reset buttan	●	○	○
Service and support			
Warranty period (manths)	12	12	12
On-site service	○	◒ [9]	●
Toll-free support number	○	○	○
Daily suppart (hours)	8–3	n/a [10]	n/a [10]
Weekend support	○	n/a [10]	n/a [10]
Electronic BBS	●	○	○

[1] Price bosed on standard PC World 25-MHz 486 system configuration: 4MB RAM, 110MB hard disk, 1.2MB (or 1.44MB 3½-inch) floppy drive, VGA and color VGA monitor, at least one parallel and one serial port, 101-key keyboard, and DOS 3.3 or later version.
[2] Same as footnote 1, except with 120MB hard disk.
[3] Same as footnote 1, except with 100MB hard disk.
[4] The 486 chip has built-in 387 capability.
[5] Two seriol ports.
[6] Includes installable RAM on the motherboard or in any CPU-speed slot.
[7] Can also run standard 8/16-bit boards at 8 MHz.
[8] Memory above 4MB requires a memory expansion board with DIP switches.
[9] One year available for $25.
[10] Availoble through deoler.

the Premium 486/25's AT-like bus. However, one of the few compelling applications for Micro Channel throughput is serving multiple users with high-performance mass storage, and neither of these systems can hold more than one hard drive.

The Premium 486/25 ISA offers better DOS performance than IBM's 486 for about $4000 less.

We don't ordinarily harp on performance. But considering the abundance of inexpensive 33-MHz systems, it seems silly to pay cutting-edge prices for a questionable speed increase (see "Ten 33-MHz Systems: The 386 Hits Top Speed," February 1990). That's why there are no Best Buys in this article. We're waiting for 486s to hit 33 MHz, when we'll have a *real* speed boost to shout about.

AST Premium 486/25 ISA

The Premium 486/25 ISA offers better DOS performance than IBM's 486 for about $4000 less in our standard review configuration. Its OS/2 performance, however, lags well behind that of the Model 70 486 and is actually a bit worse than that of AST's own Premium 386/33.

With an AT-sized chassis that accommodates up to five drives, the Premium 486/25 ISA can easily handle the mass storage needs of a work group. The slot count is also server caliber, with two 8/16-bit slots, one 8-bit slot, and two 32-bit memory slots open (unoccupied, the memory slots can double as 8/16-bit slots).

The system accommodates up to 36MB of CPU-speed RAM, a healthy chunk that's suitable for UNIX-based multiuser applications. It's also the only

machine to support the powerful and expensive Weitek 4167 coprocessor. If you're one of the few CAD users with a program that supports this chip, you could be in for blazing performance.

The Premium 486/25 ISA sits at the top of a product line that stretches from the 386SX/16 to the 386/25 to the 386/33. The only difference among these machines (aside from the BIOS) is in the removable processor board, which occupies the third 32-bit slot; taking your machine from the bottom to the top of the line is merely a matter of swapping boards. The upgrade from 386/33 to 486/25 ISA costs $2995.

A few patch wires on the 486 board indicate that the design will probably be tweaked before production reaches volume levels. The board comes with 4MB of CPU-speed RAM; to add more, you need to buy a special memory expansion board (with a 16MB capacity), which poses a couple of minor problems. Seating the board properly in a 32-bit slot requires considerable force, and removing it in a hurry could damage the motherboard. Also, you may find that you have to set DIP switches on the memory board (the system otherwise offers switchless setup).

If you run into trouble, AST provides the usual 12-month warranty, but unlike IBM and NCR the company also furnishes a toll-free support line. The support staff answered our three anonymous calls immediately, and an easy-to-use bulletin board service (BBS) lets you leave queries during off hours. On the downside, AST doesn't offer on-site service, and phone support seems intended for East Coast customers, ending at 3 p.m. PST.

A large board and drive capacity, along with copious RAM headroom, makes the Premium 486/25 ISA a good choice for UNIX multiuser and network server applications. It's the best deal for the money, and you'll be well served by AST's responsive support. If you own a Premium 386/33, though, $2995 is too much to pay for the 486 upgrade board's minimal performance boost.

WHY YOU'LL WANT A 486

It may seem crazy, but we'd like to propose that 486 systems are really for typical business users. Who, you might ask, needs a CPU that can outprocess the fastest 386 to run *WordPerfect, 1-2-3,* or *dBASE?*

Nobody does. We're really recommending not a processor, but software—specifically, graphical environments and their applications, which are proven to spark significant productivity gains.

Without a very fast system, users accustomed to text-based programs take a step backward in performance when they switch to, say, Presentation Manager applications. Even if that particular environment should turn out to be a dud, the future still holds ever more intuitive software with bigger productivity payoffs—and 486-sized power requirements.

Does that mean you should run out and buy a 486 today? Our performance tests of the machines reviewed here indicate that it might be wise to wait for 33-MHz 486s. When you invest in one of those, you'll have a system with the maximum life span, ready to tackle a new generation of graphics-based, high-productivity software.
—*E. K.*

MARC SIMON

A Micro Channel clone that led by a nose in our processing-only test, the NCR PC486/MC features a big-ticket price and a bit more expansion capacity than IBM's PS/2 Model 70 486.

IBM PS/2 Model 70 486

The Model 70 486 has the small footprint and limited expansion capacity typical of a single-user workstation.

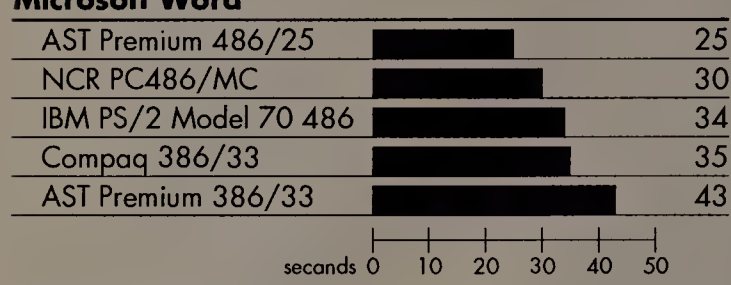
NSTL TEST REPORT

486 Versus 386: Too Close for Comfort

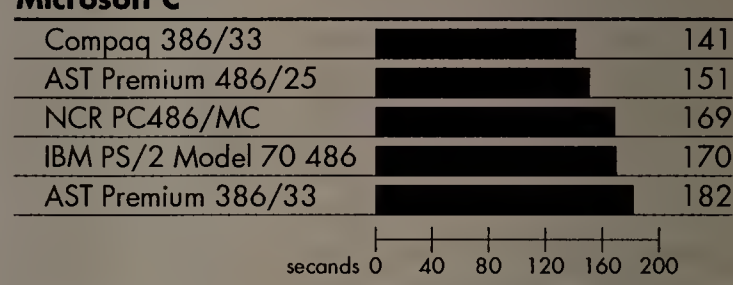
In the DOS tests, the 25-MHz 486 machines reviewed here do better than the benchmark 33-MHz 386s, but not by much. The big surprise is that Compaq's Deskpro 386/33 takes top honors in the OS/2 tests.

DOS

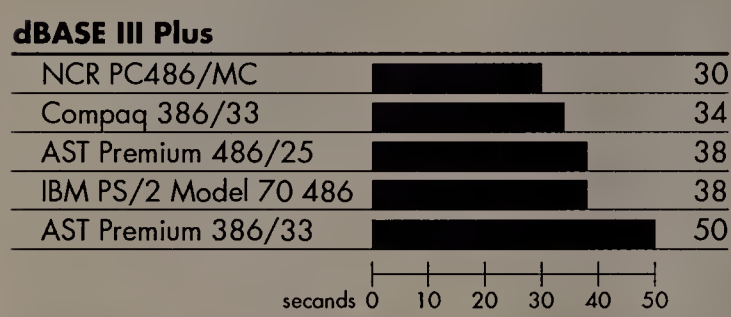
Microsoft Word



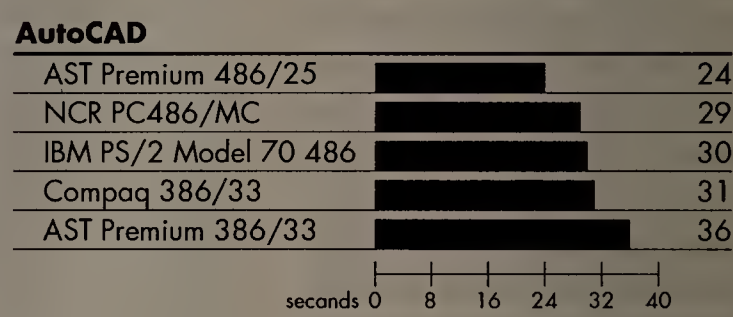
Microsoft C



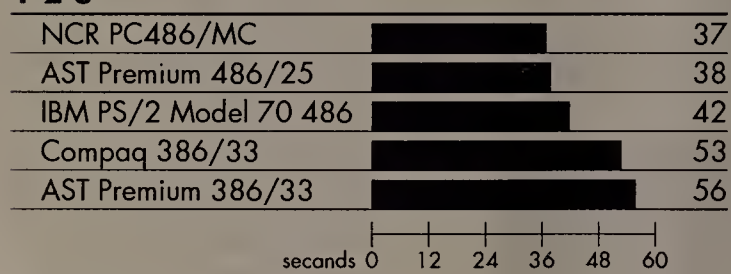
dBASE III Plus



AutoCAD



1-2-3



Methodology
All machines were tested with a 256K extended memory disk cache (program supplied by the vendor) and a coprocessor. Each system was tested with 4MB of RAM. Systems were configured with the following sizes of hard disks: AST Premium 486/25 ISA and Compaq Deskpro 386/33, 320MB; AST Premium 386/33, 150MB; IBM PS/2 Model 70 486, 120MB; and NCR PC486/MC, 105MB.

Microsoft Word 4.0
A *Microsoft Word* macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

dBASE III Plus 1.1
The *dBASE III Plus* test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk coching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

1-2-3 2.01
In this benchmark, a *1-2-3* macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

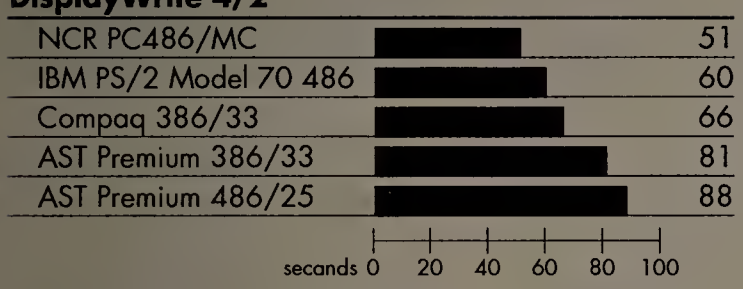
Both the fastest OS/2 machine and the slowest DOS entrant of the 486s tested, the IBM is also the most expensive—$15,133 in the standard configuration except with 10MB more disk space. It even tops the costly NCR PC486/MC.

As with the Premium 486/25 ISA, the difference between the Model 70 486 and its predecessor (the 25-MHz, 386-based Model 70-A21) lies in the removable processor board and a couple of BIOS chips. Unlike AST, IBM insists that only dealers perform the upgrade. We counted no fewer than 11 patch wires on the 486 processor board, which (knowing IBM) will likely be remedied before the machine ships in volume.

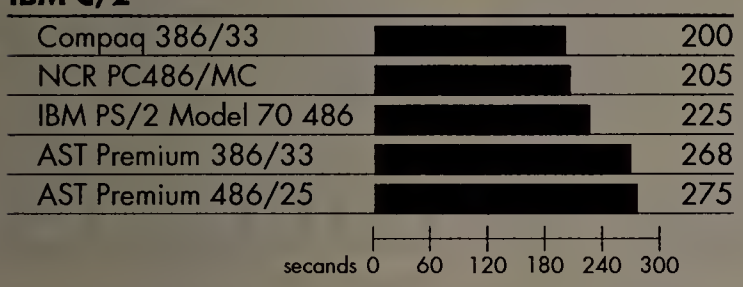
For a 486 system, the Model 70 has a low ceiling on CPU-speed RAM. You can install only 8MB worth of single in-line memory modules (SIMMs) on the motherboard; any other 32-bit RAM must be installed on the Micro Channel, which runs at less than half CPU speed.

OS/2 Single-Tasking

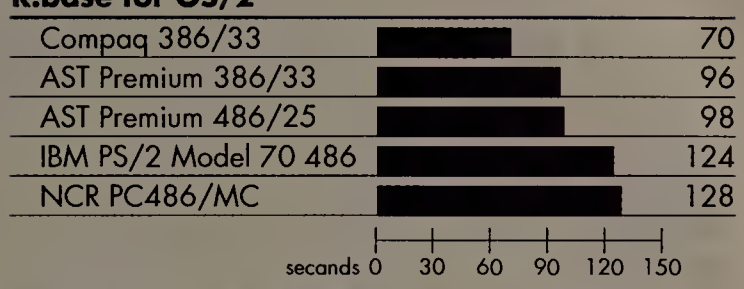
DisplayWrite 4/2



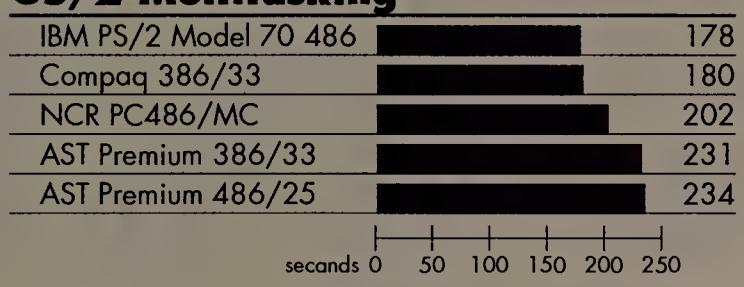
IBM C/2



R:base for OS/2



OS/2 Multitasking



Microsoft C 5.0
The *Micrasaft C* benchmark measures the time required ta campile and link *XLISP*. The mast impartant factars in this benchmark are pracessar and memary access speeds. The perfarmance af the hard disk is alsa a factar; generally, disk caching has little effect.

AutoCAD 9
In this benchmark, a three-dimensianal sample drawing is retrieved and displayed using *AutaCAD*'s EGA driver. The zoom functian is used ta display the drawing fram varias perspectives; then the full drawing is printed. The results af the benchmark depend primarily an the speeds at which the pracessar and caprocessar aperate and at which memary is accessed. The perfarmance af the display adapter and the hard disk alsa have same effect.

DisplayWrite 4/2
Althaugh the hard disk access rate plays a small part in this benchmark, processing and memary access speeds are the mast significant factars. Memary architecture affects memary access speed: Systems that require additianal memary in standard expansian slats ta run OS/2 exhibit belaw-average perfarmance.

While *DisplayWrite 4/2* is laading, the keystrakes ta start a *DisplayWrite* macra are entered. The macra laads a 35-page, 140-paragraph document, replaces each occurrence af the ward *today* with *tamarraw*, uses the built-in spelling checker ta look far any incarrectly spelled wards (there are nane), paginates the document, prints the first page ta an IBM Praprinter II, and exits *DisplayWrite*.

IBM C/2
In this benchmark, processing and hard disk sequential access speeds are the mast impartant factars. The benchmark measures the time required ta campile the 25 saurce cade files that make up *XLISP*, a public-damain LISP interpreter.

R:base for OS/2
Pracessing and hard disk randam access speeds are the mast significant factars in this benchmark. Disk caching dramatically impraves apparent disk access speed. This benchmark measures the time it takes ta praduce a repart based an a three-file jain, select, and sart.

OS/2 Multitasking
In twa sessians, IBM's *C/2* campiles the 25 C saurce cade files that make up *XLISP*. The results af this benchmark are determined by calculating the difference between the first sessian's starting time and the secand sessian's ending time.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

However, the bus has one 16-bit and two 32-bit Micro Channel slots free, and the recently announced 320MB hard disk option is a definite improvement on the old 120MB ceiling.

IBM supplies the finest finishing touches of the group. The Model 70 486's chassis first appeared with the Model 50, and the slide-in drives and snap-apart drive platform make reconfiguration as easy as ever. The setup and diagnostics software is still the best around, and it supports the Micro Channel's most obvious benefit: software-based board configuration.

Even though IBM itself offers no phone support to customers, the company's dealers are among the best qualified in the business. In addition, a mere $25 buys on-site IBM service for the first year.

Though the Model 70 486's DOS scores bring up the rear, the system wins top honors in our OS/2 multitask-

EXECUTIVE SUMMARY

Fast, but Not Fast Enough

Early 486 arrivals can't live up to expectations

No systems in this review rated a Best Buy, given the surprisingly small performance edge over less expensive 33-MHz 386 systems.

Of the three systems evaluated, the **AST Premium 486/25 ISA** has the best price by a mile. Its large memory and drive capacity make it the best unit for network server or multiuser applications. In addition, an upgradable processor scheme will let you turn the system into a faster, more cost-effective 33-MHz 486.

	AST Premium 486/25 ISA	IBM PS/2 Model 70 486	NCR PC486/MC
Performance	Good	Good	Good
CPU-speed RAM capacity	Excellent	Fair	Excellent
Expandability	Excellent	Fair	Fair
Design	Good	Good	Good
Service and support	Good	Good	Good
Overall value	Good	Fair	Fair
Reader service no.	601	602	603

How we rate 486 systems
We rate 486 systems based on information in the Features Evaluation table and the NSTL Test Report, combined with our opinion of quality, reliability, and user benefit.

Performance scores are compared against a data base of test results both inside and outside the 486 class. PCs with 25-MHz 486 CPUs are among the fastest you can buy, but to earn an Excellent rating, a 486 system must excel in at least two-thirds of the benchmarks when tested against other machines in its own class.

CPU-speed RAM capacity refers to the amount of RAM installable on the motherboard and in any special fast slot. This is a primary criterion because low capacity can degrade memory-hungry programs' performance. Only 486 systems with 16MB or higher capacity receive an excellent rating.

Expandability applies to the number of free slots and the number and density of mass storage devices supported. To receive an Excellent rating, AT-sized systems must have five slots open and room for two full-height drives; PS/2-sized workstations must have four open slots and handle at least 300MB of hard disk storage.

Design includes quality of construction, accessibility of controls, and ease of setup. Excellent ratings are awarded to well-designed and -manufactured systems with switchless setup, quality monitors, and durable keyboards.

Service and support includes the length of warranty, quality of documentation, quality and availability of phone support, support hours, and other support services. At least one year's full warranty, on-site service, long support hours, and prompt, effective response yield an Excellent rating.

Overall value averages all the above criteria plus price. The high prices of the IBM and NCR machines and the fact that they did not consistently outperform 33-MHz 386 systems resulted in the Fair overall ratings.

ing test (which may in fact be due to the Micro Channel's superior throughput, since this benchmark pushes the most data through a system's bus). However, Compaq's Deskpro 386/33 still delivers more OS/2 zip overall. Add this irony to the usual IBM desktop liabilities—high price and room for only one hard drive—and the Model 70 486 fails to earn our recommendation.

NCR PC486/MC

If we gave technology awards, NCR's PC486/MC would get a gold star. This Micro Channel system's sophisticated memory architecture squeezes out a slight edge in processing speed, and its overall DOS performance virtually matches that of the top DOS machine, the AST Premium 486/25 ISA. The OS/2 performance falls only a little behind the PS/2 Model 70 486's, but the $14,389 price tag (in the standard configuration except with 10MB less disk space) is too close to IBM's for comfort.

The PC486/MC's motherboard, designed by Advanced Logic Research (ALR), is the only one reviewed to offer a secondary memory cache for the 486. When the 486 can't find the desired data in its internal 8K cache, it flips into burst mode and begins gorging itself on data from the PC486/MC's special interleaved cache. Without the secondary cache the 486 would have to go directly to main memory, which can cause time-wasting wait states.

The motherboard's caching scheme accounts for the machine's slight lead in the processing-only *1-2-3* benchmark. However, like the Model 70 486, the PC486/MC contains a disturbing number of patch wires—ten, in this case.

The PC486/MC exceeds the Model 70 486 in expansion capacity, offering four open Micro Channel slots and the choice of a 100MB or 200MB SCSI hard disk. In addition, the SCSI controller has a connector on the rear bracket that enables you to hook up external SCSI devices to boost the mass storage maximum.

One of the system's three 32-bit slots is dedicated to memory and runs at CPU speed. The special memory board holds up to 16MB of CPU-speed RAM, upgradable only in big 4MB chunks because of the interleaved caching scheme.

The PC486/MC's compatibility with Micro Channel devices is far superior to that of NCR's 386SX, which we reviewed last January. In fact, the PC486/

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Circle 62 on reader service card

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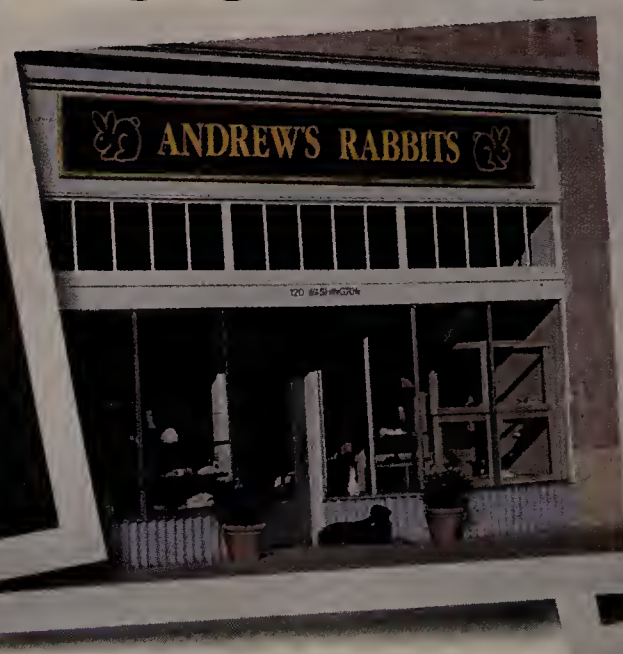

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MC is the only Micro Channel clone we've tested that can function as a server with an IBM Token-Ring or SMCA Arcnet board installed (the PC486/MC's external cache had to be disabled, but with negligible effect on performance). It was also completely compatible with the Hayes 2400P internal modem and the JT Fax board.

NCR is the only company in this group to offer free on-site service with the price of the system. However, there's no phone support line.

The PC486/MC's architecture is impressive, but it's not clear that the cost of the secondary memory cache is worth the performance gain. Perhaps that's why AST abandoned plans for a secondary cache on its own 486. The PC486/MC offers much better OS/2 performance than the Premium 486/25 ISA and roughly equivalent DOS scores, but the $3000 difference in price is too much to swallow.

Half a League Onward

The best apples-to-apples comparison we have—the AST Premium 486/25 ISA versus the Premium 386/33 in the processing-only *1-2-3* test—indicates that you can expect about a 32 percent increase in processing speed when you move from a 33-MHz 386 to a 25-MHz 486. If all business tasks were like spreadsheet recalcs, you'd appreciate this speed increase.

With typical business applications, the margin between 25-MHz 486 and 33-MHz 386 systems seems negligible.

With typical business applications, however, the margin between 25-MHz 486 and 33-MHz 386 systems seems negligible. That's because the processor has to cool its heels during the hard disk activity required by most programs.

Caching software, fast hard disks, and enhanced controllers can help ease the hard disk bottleneck. But applications that hold data in memory rather than fetching it from disk provide the best way to reap the benefits of faster processing speed. The 386-specific versions of *Paradox* and *Foxbase* are two of the best current examples. *Windows 3.0* also promises to make more effective use of memory so that *Windows* programs can use larger files without swapping to disk.

The 33-MHz 486 promises a 50 to 60 percent processing edge over the 33-MHz 386. That's *real* headway, but to get the most benefit you'll need at least 8MB of RAM and applications that work overtime to stay away from the hard disk. Fortunately, memory prices are pretty low these days, so you may not have to break the bank to configure your power workstation.

Eric Knorr is a senior editor for PC World.

For more information about all products in this article, circle reader service no. 901.

WHERE TO BUY

AST Premium 486/25 ISA
AST Research, Inc.
16215 Alton Pkwy.
Irvine, CA
92718-9658
714/727-4141,
714/727-9363 (fax)
LIST PRICE: Model 5 with 4MB RAM, 1.2MB floppy drive, one parallel and two serial ports, 101-key keyboard $8495; Model 115 with 110MB IDE hard disk $9995; Model 325 with 320MB ESDI hard disk $12,145
ACCESSORIES: 32-bit 16MB memory expansion board with 1MB $650; 1MB RAM $200; color VGA monitor $695; AST VGA Plus $329; OS/2 1.1 $340; DOS 3.3 $95, DOS 4.01 $125; FastBoard 486/25 upgrade for Premium 386/33 $2995 (for Premium 386/25 $3995, for Premium 386SX/16 $6395)
WARRANTY: one year parts and labor
EXTENDED WARRANTY: none
TECHNICAL SUPPORT: toll number, M–F 8–3
OTHER SUPPORT: optional on-site service plans
Reader service no. 601

PS/2 Model 70 486
IBM
1133 Westchester Ave.
White Plains, NY
10604
800/426-2468
LIST PRICE: Model 70-B61 with 2MB RAM, 60MB hard disk, 1.44MB 3½-inch floppy drive, built-in VGA, one parallel port, one serial port, one mouse port, 101-key keyboard $12,395; Model 70-B21 with 120MB hard disk $12,990
ACCESSORIES: 1MB RAM $695, 2MB RAM $1395; 32-bit 8MB memory expansion board with 2MB $1695; 8512 color VGA monitor $623, 8513 color VGA monitor $750; mouse $99; DOS 3.3 $125, DOS 4.01 $150; OS/2 1.2 $340, OS/2 Extended Edition 1.2 $830
WARRANTY: one year parts and labor; on-site service $25 for the first year
EXTENDED WARRANTY: through dealer
TECHNICAL SUPPORT: through dealer
OTHER SUPPORT: BBS
Reader service no. 602

NCR PC486/MC
NCR Corp.
Workstation Products Division
1601 S. Main St.
Dayton, OH 45479
800/544-3333
LIST PRICE: Model 3314-1040 with 2MB RAM, 1.44MB 3½-inch floppy drive, NCR Super VGA, one parallel port, one serial port, one mouse port, 101-key keyboard $9995; Model 3314-1141 with 2MB RAM and 100MB SCSI hard disk $12,495; Model 3314-1241 with 8MB memory and 100MB SCSI hard disk $15,495; Model 3314-1242 with 8MB RAM and 200MB SCSI hard disk $16,995
ACCESSORIES: 2MB RAM $1195, 8MB $3495; color VGA monitor $699, enhanced color VGA monitor $899; 1024 by 768 graphics coprocessor board $1595; Microsoft Mouse $150; DOS 4.01 $150; OS/2 1.1 $340
WARRANTY: one year parts and labor, on site
EXTENDED WARRANTY: available
TECHNICAL SUPPORT: through dealer
OTHER SUPPORT: none
Reader service no. 603

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Super Storage

At pennies per megabyte, erasable-optical drives give traditional hard disks a run for your money. And you can't find a safer place to put your data.

Robert Luhn

ROBERT CARDIN

Optical disk drives have long been advertised as a storage panacea, a veritable bottomless pit for data. But the promise and the reality have often been separated by light-years of hype.

Write once, read many (WORM) optical drives can store hundreds of megabytes on removable cartridges, but once the data is written, it can't be erased. And though you can treat a WORM drive like a hard disk, day-to-day use means enduring a convoluted "mounting" procedure before DOS will recognize files—hardly an intuitive process. The CD ROM, a kissing cousin of the commercial CD, isn't much of a solution for business users, either. Like the CD, it's immutable—and someone else supplies the data.

Fortunately, promise and reality have finally met—more or less—in the form of new erasable-optical (EO) drives sporting 650MB and even 1GB (gigabyte) cartridges. If you need to store or back up massive data bases, accounting records, applications, fonts, scanned images, and CAD files at your PC or on a network server—and speed isn't your sine qua non—EO drives are just the ticket. They act like hard disks yet offer virtually unlimited storage, because their 5½-inch cartridges are removable. If you need the portability of a

FEATURES EVALUATION

Do Erasable-Optical Drives Work Like Hard Disks?

The answer is yes—but some EO drives are more equal than others. Look for the ability to boot, flexible formatting, and compatibility with key operating systems like OS/2 and NetWare.

● Yes
○ No
◒ Deficient

Capacity/expandability	Alphatronix Inspire	MDI LaserBank 600R	Storage Dimensions LaserStor Erasable[1]	Summus LightDisk SO-600
List price[2]	$7200	$5985	$7995	$5980
Cartridge price[3]	$250	$300	$395	$250
Formatted capacity—DOS[4]	646MB	612MB	924MB	594MB
Cost per megabyte stored—DOS[5]	39¢	49¢	43¢	42¢
Formatted capacity—NetWare[4]	626MB	612MB	880MB	594MB
Cost per megabyte stored—NetWare[5]	40¢	49¢	45¢	42¢
Smallest DOS volume	323MB	16MB	7MB	1K[6]
Largest DOS volume	323MB	306MB	462MB	256MB[6]
Maximum number of volumes	1	8	24	26
Boots PC from drive	○	○	●	●
Dynamically swaps cartridges	●	●	●	○
Engine	Sony	Sony	Maxtor Tahiti I	Sony
Adapter	SCSI	SCSI	SCSI	SCSI
16-bit cards available	◒[7]	●	○	●
Maximum per PC or server	1	1[8]	4	1
Maximum drives per adapter	7	7	7	7
Maximum storage	4.55GB	4.2GB	12.9GB	4.1GB
Runs other devices	◒[9]	●	◒[9]	●
Works with AT controller	●	●	●	●
RAM needed for drivers	20K	25K	10K	n/a
Operating shock rating (g's)	35	25	2	30
Mean-time-between-failure rating (hours)	20,000	20,000	30,000	20,000
Setup and installation				
Automatic software installation	●	●	●	○
FDISK compatible	○	○	●	●
Patches and unpatches DOS[10]	●	●	○	○
Novell certified	●	○	○	○
Shipped with NetWare installed	○	○	○	○
Supports EMS	○	○	○	○
Supports caching	●	●	◒[11]	○
Compatibility				
PCs, XTs, ATs, 386 systems	●	●	●	●
Micro Channel systems	●	●	●	○
NetWare servers and workstations	●	●	●	●
DOS 2.x	○	○	●	○

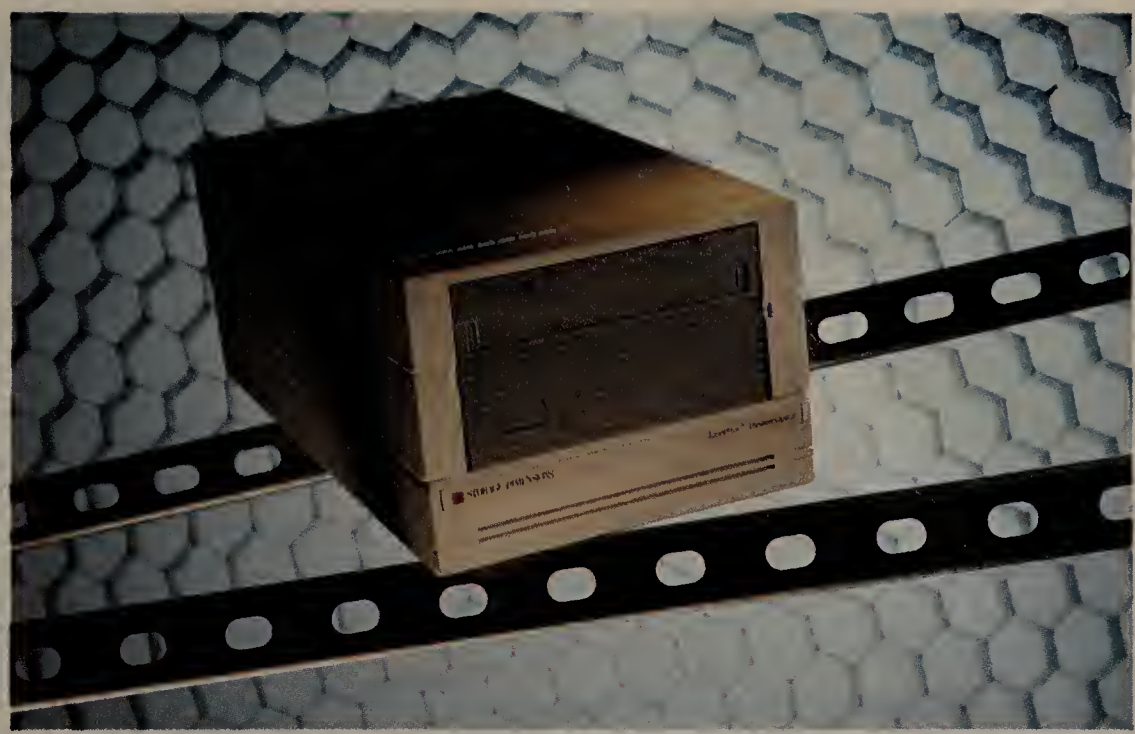
Compatibility (continued)	Alphatronix Inspire	MDI LaserBank 600R	Storage Dimensions LaserStor Erasable[1]	Summus LightDisk SO-600
DOS 3.x	◒[12]	◒[13]	●	●
DOS 4.x	●	●	●	●
OS/2 1.1, 1.2	○	●	○	○
Macintosh OS	●	●	●	●
Sun OS	●	●	●	●
SCO Xenix	○	●	○	○
DEC VAX	●	○	●	●
AIX	○	○	○	○
NetWare 2.0a	○	○	○	●
NetWare/286 2.15	◒[14]	●	◒[14]	●
NetWare/386	○	○	○	○
3Com 3+	○	●	○	○
PC LAN	●	●	○	○
TOPS	●	●	○	●
Utilities				
Automatic read-after-write verification	●	○	●	○
Automatic reallocation	●	●	●	○
Disk cache program	○	○	○	○
Disk diagnostics	○	◒[15]	●	○
Data recovery	○	○	○	○
Backup/restore program	○	◒[16]	○	○
Security functions	○	◒[17]	○	○
Warranty				
Number of years	1	1	1	1
Extended warranty	●	●	○	●
Money-back guarantee	●	●	○	○

[1] Using 1GB cartridge.
[2] Includes cost of drive, adapter, cable, and software for DOS system.
[3] Cost of double-sided disk.
[4] Both sides of cartridge under DOS 3.3x.
[5] Cost of cartridge divided by total formatted capacity.
[6] Under DOS 4.x.
[7] Only for NetWare servers.
[8] Four adapters under OS/2.
[9] Limited to vendor's SCSI drives.
[10] Only DOS 3.x.
[11] Only under NetWare.
[12] Only DOS 3.1 or later version.
[13] Only DOS 3.2 or later version.
[14] Only NetWare 2.15c.
[15] Some utilities freeze system.
[16] For NetWare only, $595.
[17] Can write-protect during current session.

floppy, the capacity of a WORM drive, and the flexibility of a hard disk, an EO drive is the answer.

Just remember that EO drives aren't cheap—none lists for under $5000. And none can outpace a typical 40MB hard disk. But on a cost-per-byte-stored basis, they beat everything but a WORM drive. When it comes to ruggedness, EO drives beat hard disks by a furlong. Head crashes are impossible; some EOs can withstand up to 35 g's of operating shock; and their rugged 5½-inch cartridges can be stashed in a safe. *That's* data security few other drives can offer.

This review examines four external units—Storage Dimensions' LaserStor Erasable, MDI's LaserBank 600R, Alphatronix's Inspire, and Summus's LightDisk SO-600. All these drives not only can play the role of a PC hard disk but can be attached directly to a NetWare server and act like true NetWare volumes. Except for the LaserStor, all are built around Sony's basic erasable-optical drive. But as you'll see, each vendor's software and adapter can make a big difference in performance and ease of use.



Storage Dimensions' LaserStor Erasable isn't the fastest drive, but it best mimics a hard disk and offers 1GB per cartridge.

Before You Buy

The two critical factors to check out when considering an EO drive are its sheer storage capacity and, more important, how closely it mimics a hard disk. In most cases, you won't be disappointed. You can save and erase files at will, use almost any DOS application or utility, and boot your PC or server off the drive. Installation essentially involves plugging a SCSI adapter into a slot, connecting the EO drive, sticking an optical cartridge in, and formatting the cartridge with either DOS or similar commands.

But there are some trade-offs and pitfalls. If you have an irresistible yen for storage, consider the following factors before you pull out your wallet.

Performance No EO drive is fast enough to replace the hard disk in a speedy 286 or 386. Nor can an EO drive take on the role of a network server's primary drive in anything except a small LAN, but it can easily act as a secondary server on a LAN. And if you want the fastest EO, don't be fooled by vendor-supplied average access times. Despite Storage Dimensions' claims, MDI's 83ms LaserBank beat Storage Dimensions' 35ms LaserStor in three out of five NSTL tests. However, most of the reviewed EO drives are speedy enough for day-to-day tasks and support DOS or NetWare caching schemes.

Capacity and Expandability These EO drives may not be speed demons, but they outstore every rewritable device on the market. Most hard disks, for example, store a megabyte for $7 to $14; an EO drive can do the job for a measly 44 cents per megabyte.

The storage king in this roundup is clearly the Storage Dimensions LaserStor, which packs 924MB on a proprietary 1GB cartridge. The other drives use 600MB to 650MB cartridges, but formatted capacity varies. The LaserBank can manage only 612MB, while the Inspire squeezes out 646MB.

Since all the drives use SCSI controllers, you can daisy-chain up to 7 drives for more than 4GB of storage. Storage maniacs can attach 28 drives to four LaserStor controllers for a total of 12.9GB.

Compatibility To verify software compatibility, we tested each unit with a passel of tough DOS commands (from CHKDSK to COMP to FORMAT); RAM disks; *Norton Utilities* (from file finding to unerasing); disk defraggers such as *Optune;* and memory resident programs such as *Keyworks.* With a few exceptions, the drives passed with flying colors.

Hardware compatibility isn't a problem—in fact, EO drives are the perfect solution for multimachine environments. With the proper adapter and software, most of the EO drives can work with PCs, Apple Macintoshes, Sun workstations, or even VAXs and MicroVAXs. Operating system support is just as broad, although only the MDI supports OS/2.

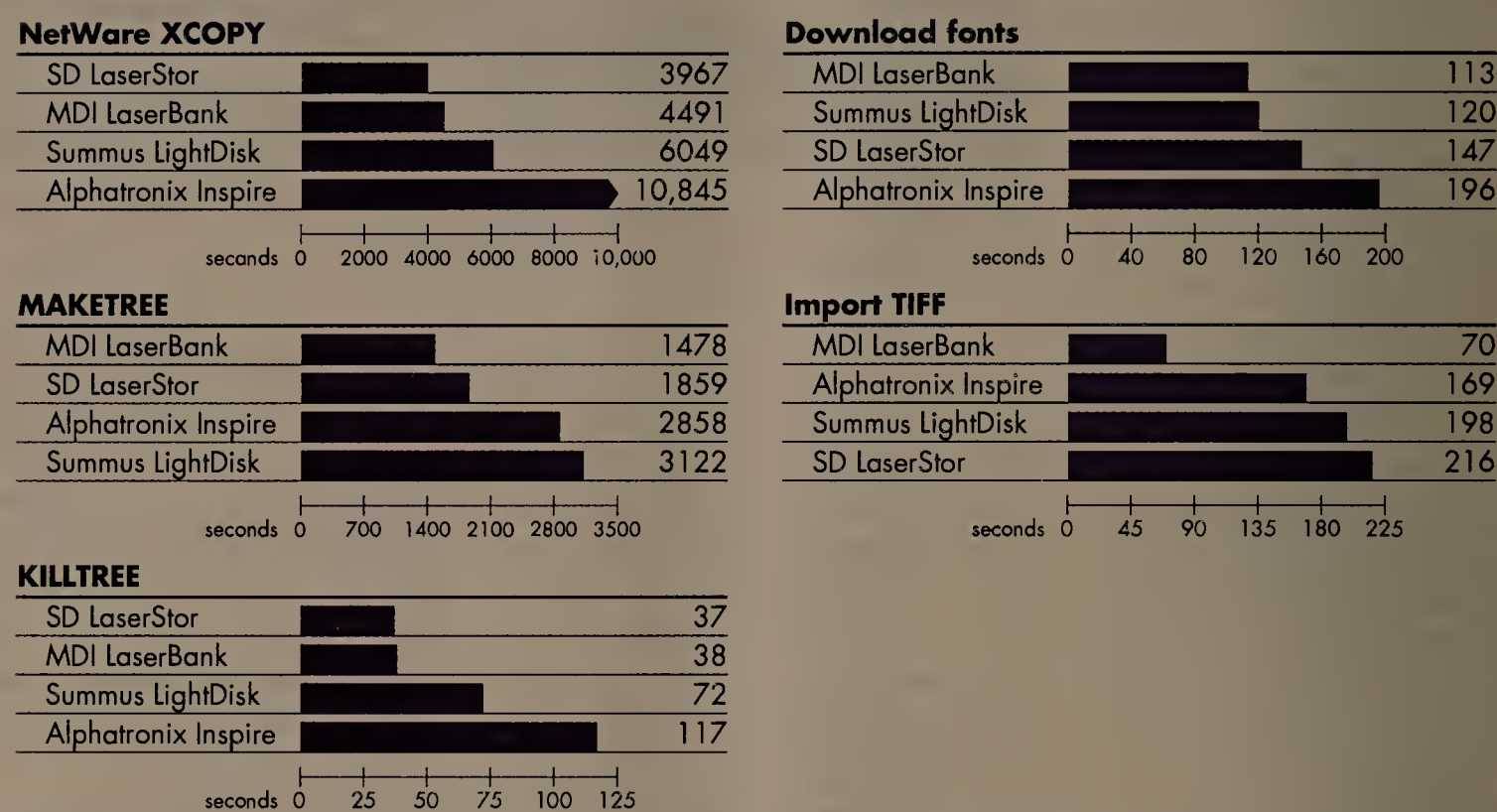
However, vendor claims that you can read data from a different drive's disk are bushwa. All the drives adhere to ISO conventions, so they can use standard 3M or Sony media, but their formatting schemes vary considerably. Disk interchangeability is not a reality—yet.

Reliability Like WORM drives, EO drives are as tough as hard disk drives, and their cartridges can literally be drop-kicked or passed in front of a magnet without damaging data. Data secu-

NSTL TEST REPORT

Optical Drives: Vast, Versatile Storage

The LaserBank is the clear speed champ, and the LaserStor is a close second, but neither feels as fast as a hard disk. However, both drives are fast enough for many day-to-day tasks, and they're perfect for backup and as secondary network servers.



Methodology
Erasable-opticol drive tests were canducted using a Campaq Deskpra 386/20 with 1MB of RAM, a 330MB ESDI drive, and a Taken-Ring odopter. Campaq DOS 3.31 was instolled an the hord disk olong with all ather test saftware. The test drive wos connected to the Deskpra 386/20 using the cantraller board pravided by the manufacturer. Tests were perfarmed with DOS VERIFY an. The Alphatranix Inspire alsa has its awn verify pragram, and the drive was tested with that utility an (in default made). Althaugh the results aren't tallied here, tests were alsa perfarmed with DOS 4.01 with substantially similar results. The file server far the NetWare XCOPY test was o Campaq 386/25 with 5MB af RAM, NetWore 2.15, and o 330MB ESDI drive. The contral CPU for the TIFF test wos o 16-MHz Compaq 386S with 6MB af RAM, DOS 3.31, and a 40MB ESDI drive. The tested drives used the fallawing rated capacities af starage media: Summus LightDisk SO-600, 600MB; Alphatranix Inspire and MDI LaserBank 600R, 650MB; Starage Dimensians LaserStar Erasable, 1GB.

NetWare XCOPY
XCOPY is used ta duplicote 120MB af files fram a dedicated netwark server ta the test aptical drive.

MAKETREE
MAKETREE.EXE is used to generate ane directary and ten subdirectories of 10MB each.

KILLTREE
KILLTREE is used to delete the directory ond subdirectaries generated in the MAKETREE test.

Download fonts
A *Micrasoft Word* mocro is used to download 2MB af Bitstream fonts from the test drive to o Hewlett-Pockord LaserJet Series II printer.

Import TIFF
A 300K TIFF file is imported from the test drive into *Venturo Publisher* in enlarged view mode.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

rity, in fact, is the EO's selling point. Error rates are 1 in 10^{12}—better than some hard disks'—and the Inspire and LaserStor drives automatically verify data after it's written; three of the drives automatically relocate data from bad disk sectors. All this means your data is secure—so secure that you shouldn't have to "mirror" or "duplex" EO drives on a NetWare LAN.

Setup and Configuration The good news: If you can install a 300MB hard disk, you can install an EO drive. The bad news: The process is just as ugly, and you'll be greeted by manuals that are out of date, missing key steps, and lacking basic information—like how to format a disk or when to turn on the drive (always do it *before* you turn on your PC).

Every drive has its quirks; the bottom line is flexibility. For example, the Inspire under DOS is limited to one huge volume and isn't bootable; the

Storage Dimensions LaserStor can boot a PC or a network and lets you create volumes as small as 7MB. Connected to a NetWare server, however, all the EO drives are limited to two volumes per cartridge side.

Just remember that EO drives aren't double-sided, so only half a cartridge's total capacity is available at a time. Once a drive is up and running, getting at that other 300MB or so means flipping the cartridge over. Worse, the Summus LightDisk can't swap cartridges dynamically. To read a new cartridge, you must reboot the system.

Note, too, that these drives don't include many extras. Although they're all perfect for network backup, only the Inspire comes with a NetWare 2.15c backup program. Password security features are absent, as are disk caching utilities. Worse, there's no file management program aimed at handling gigabytes of data. All you can do is create a slew of volumes from D: to Z: and manage the thousands of files with DOS, *Xtree*, or *Windows*.

MDI's LaserBank 600R is the roundup's speed demon, and it's priced right. However, setup is difficult and software compatibility a little shaky.

Storage Dimensions LaserStor Erasable

The LaserStor isn't the fastest EO drive—Storage Dimensions' claims to the contrary—but speed isn't the bottom line here. If you want a flexible hard disk mimic with storage to spare, the LaserStor is the best all-around choice.

For starters, you can boot from the drive and call on 924MB per cartridge. Like the Alphatronix Inspire, the LaserStor keeps data secure by verifying files immediately after they're written and automatically relocating data from flawed areas on disk, but the performance penalty isn't as steep as with the Inspire. And while the LaserStor isn't a multiplatform wonder like the Inspire, you can hook it up to an Apple Macintosh or NetWare server for half or one-third the cost.

You can chain-gang up to 28 of the huge-capacity LaserStor drives for nearly 13GB of storage, making it a perfect secondary drive for a NetWare server—or even an acceptable primary drive if a network's hard disk crashes. In fact, the LaserStor Erasable is clearly the network EO drive of choice. It's the fastest on a LAN, and Storage Dimensions offers a complete NetWare installation kit.

Setting up the drive, however, isn't for casual users. The hardware installation manual is LaserStor specific, lucid, and well illustrated, but the software manual is a pseudogeneric guide to using the company's menu-driven *SpeedStor* utility with *any* Storage Dimensions drive. As a result, you must sift through confusing hard disk instructions and screen shots that don't match the menu-driven setup program. If you ignore the manual and just run the program and follow the menus, you can probably format and partition the disk fairly easily. The downside? The "automatic" formatting mode limits you to a slew of 30MB or 32MB volumes or to one 462MB drive. To create custom volumes (or a bootable disk), you must run *SpeedStor*'s convoluted manual mode; you may also have to consult with Storage Dimensions' fortunately efficient tech support staff.

If you want a flexible hard disk mimic with storage to spare, the LaserStor is the best all-around choice.

Once the LaserStor is humming along, it's a snap to use. It's compatible with all DOS commands, with disk utilities ranging from *Optune* to *Check-It* to *Norton Utilities'* Quick Unerase, and with most applications. However, ancient programs like *PC-Talk III* and certain TSRs, like *Keyworks*, can freeze the system and force you to reboot your PC. Note, too, that the drive can take only 2 g's of operating shock—far less than its peers. One unit we examined failed to survive shipping. So ship the drive with care.

In sum, the LaserStor is a solid deal. If the company ever provides a drive-specific manual, simplifies software installation (especially for creating a bootable drive), and boosts overall performance, the LaserStor will rate a Best Buy. For now, it's a good buy.

The Alphatronix Inspire can connect with everything from Macs to DEC machines, but it's not bootable or very fast.

ROBERT CARDIN

MDI LaserBank 600R

By dint of its speed and price, the LaserBank 600R easily rates second place in the roundup. But prospective buyers should note that you can't boot off the drive, and it's not particularly easy to install, in large part because of needlessly confusing manuals.

Setup is probably the drive's biggest drawback. Although the unit's default switch and jumper settings work with most stand-alone PCs, the two manuals (for the SCSI adapter and drive) don't lay out the necessary steps in simple, linear fashion; worse, they're larded with technobabble, supply conflicting instructions, are poorly indexed, and often don't coincide with the setup software. It's easy to get confused, although in reality, installing the hardware largely involves plopping the adapter into a free 13-inch slot and connecting it to the drive.

Getting an optical cartridge properly formatted and partitioned is also a pain. A menu-driven installation program automatically modifies your PC's AUTOEXEC.BAT and CONFIG.SYS files; copies over the necessary drivers; and asks you to specify the adapter type, DMA channel, and SCSI I/O ports. The utility then patches DOS 3.*x* so it can recognize volumes exceeding 32MB, and formats the cartridge. (None of the drives patch DOS 4.*x*, since it can create volumes greater than 32MB.) You run another menu-driven utility to specify each volume's size, drive letter, and label.

Once done, you'll find the LaserBank a pretty swift companion. Although it's technically an 83ms drive, it runs more like a 65ms 10MB Hardcard. That's not lightning fast, but it's acceptable for the 612MB you get at your fingertips.

You'll find the LaserBank a swift companion. Although it's technically an 83ms drive, it runs more like a 65ms 10MB Hardcard.

Just don't swallow MDI's claims that the LaserBank will run "exactly like a hard disk." It won't boot, and you can't use all "regular DOS commands." A "regular" command like CHKDSK froze the drive, as did relatively innocuous programs like *Norton Utilities'* file-finding FF.EXE. Even more surprising, MDI's own (undocumented) disk and adapter diagnostic program can send the drive into hyperspace. But RESTORE, BACKUP, XCOPY, and DOS applications ranging from *Word* to *Windows* ran without a flutter.

In terms of flexibility and expandability, the LaserBank is about average. You can daisy-chain seven drives for a total of 4.2GB of storage. MDI claims you can also attach other vendors' SCSI devices, such as tape, CD ROM, and WORM drives.

As a NetWare drive or tape backup system, the LaserBank is a solid choice. It's fast, and the NetWare kit costs only $595. MDI also sells a powerful unattended network backup program for $495 that works with the LaserBank and other network devices. The program offers a number of complete or incremental unattended backup methods, handles DOS and Mac files, can be run via scripts, and can back up local and network drives.

The LaserBank isn't an airtight product. It isn't bootable, setup is difficult, and software compatibility is a little uneven. But if you have a storage pro on hand to get you over the hurdles, the LaserBank is a bargain.

Alphatronix Inspire

Alphatronix's Inspire is aimed squarely at corporations with a lot of different users (and systems) to satisfy. Although the drive trails the pack in performance and isn't bootable, you can hook it up to PCs, Macs, NetWare servers, DEC VAX, MicroVAX, and PDP systems; Sun workstations; and various LANs. With Alphatronix's extra-cost *Bypass* utility, you can even save files in DOS, Sun, or VAX format on the same drive. The Inspire is one of the easiest drives to set up (thanks to a terse but straightforward manual and a hand-holding installation program). It is compatible with all DOS commands and most applications and disk utilities.

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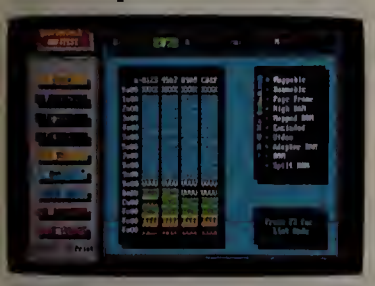

Manifest shows you things you might not otherwise know about your PC.

Manifest gives you a guided tour 'under the hood' of your PC, to show what's going on, what type and amount of memory is available, and even which portions of RAM are faster.

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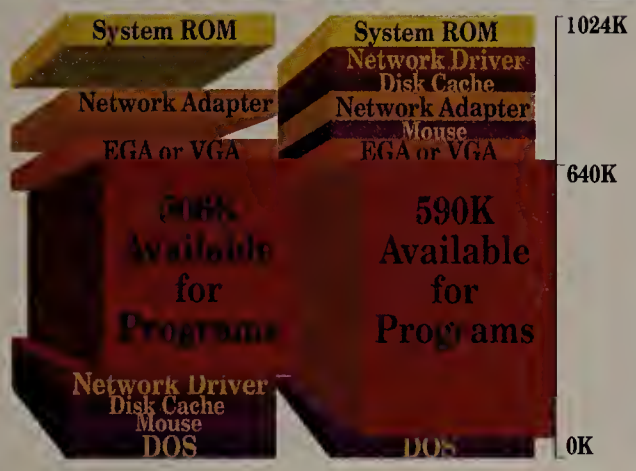
It finds and displays all the contents of your AUTOEXEC.BAT and CONFIG.SYS files, which can be a big help in diagnosing problems.



Your memory is full of holes. We can fill them. And give your programs more room to run smoothly.

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Best of all, you don't need a PhD to understand what you're doing. Manifest's interactive operation tells you how to use the program and what benefits you can expect.

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QEMM is the all-in-one memory manager for breaking the 640K barrier.

QEMM 50/60 is for the PS/2™ series 50 and 60. It works with all IBM-compatible memory boards, and comes with a long list of adapter data to help you use your MCA hardware better.

QEMM-386 is for all 386-based computers, including older PCs with 80386 upgrade boards. It allows you to expand your RAM capacity—all the way to 32 megabytes, if you like.

Both give you expanded memory compatible with EMS 4.0 and EEMS. Both are also extended memory managers, compatible with XMS.

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QRAM: 8088, 8086, 80286 PCs. Use of high memory is only available when PC has EMS 4 or EEMS expanded memory or Chips & Technologies shadow RAM.

QEMM 50/60: 80286-based PS/2s and compatibles with IBM PS/2 80286 Memory Expansion Option, IBM PS/2 80286 Expanded Memory Adapter/A or compatible.

QEMM-386: 80386-based PCs and PS/2s and PCs with 80386 add-in boards.

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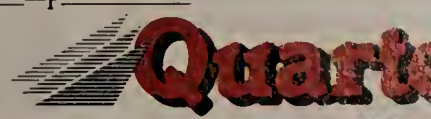

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The Inspire's expandability is another plus. You can buy a dual drive unit boasting 1.3GB of storage, daisy-chain seven drives for up to 4.55GB of data, or lay out the big bucks for an Inspire jukebox that offers 16GB, 35GB, or even 200GB of on-line storage. If you need super storage without hassles, the Inspire is a prime choice.

Alphatronix also taps every error-checking feature in the Inspire's Sony adapter. When the drive saves data, it automatically performs a read-after-write verification; when it reads data, it performs another verify. If it finds a bad sector, it automatically moves data elsewhere—a trick the LaserStor and the LaserBank also use. But only Inspire keeps reallocated blocks close to their original location so that performance doesn't degrade appreciably.

Unfortunately, the Inspire's tradeoffs may give you pause. The drive isn't bootable, and its data-verification scheme and 8-bit controller make it the slowest unit in the roundup. You'll also find managing data a pain, because you can't create multiple drives (D:, E:, and so on) on a cartridge, but only one monster 323MB volume. The drive also can't read DOS 3.*x*-formatted cartridges on a DOS 4.*x* system. Finally, connecting to another system isn't cheap: Kits range from $495 to $3000.

If you can live with its slugabed performance—and you need an EO drive for a variety of systems—the Inspire might make sense. But its performance and formatting inflexibility keep it out of the same league with the LaserStor and LaserBank.

Summus LightDisk SO-600

Summus's first EO offering takes last place in this roundup for several reasons: It's slow, it's poorly documented, and it's difficult to install. Once the system is up and running, it's relatively easy to use and compatible with the widest array of DOS commands, utilities, and applications, but getting it to that point is an exercise in frustration.

According to Summus, installing the LightDisk in a PC, Mac, or NetWare server should be a plug-and-play affair. But the job isn't quite so simple. You must first cope with a technically dense manual that fails to note such essentials as how to format and partition a cartridge. A lengthy call to Summus's technical support revealed that formatting a cartridge means manually copying and

EXECUTIVE SUMMARY

Erasable-Optical Drives—Gigabytes to Spare

Four 600MB+ drives offer unbeatable data security

None of the drives reviewed here rates a Best Buy—installation hassles, fat price tags, or middling performance stand in the way.

Of the four drives evaluated, the **Storage Dimensions LaserStor** is the best general-purpose unit. It's among the fastest for both DOS and NetWare setups, it adroitly mimics a hard disk, and it offers a maximum 13GB of daisy-chained storage.

	Alphatronix Inspire	MDI LaserBank 600R	Storage Dimensions LaserStor Erasable	Summus LightDisk SO-600
Capacity/ expandability	Fair	Good	Excellent	Fair
Setup and installation	Good	Fair	Fair	Poor
Compatibility	Fair	Fair	Good	Excellent
Warranty	Good	Fair	Fair	Fair
Design	Good	Good	Fair	Fair
Performance	Poor	Good	Good	Fair
Overall value	Fair	Good	Good	Fair
Reader service no.	620	621	622	623

How we rate erasable-optical drives
We rate EO drives based on information in the Features Evaluation table and NSTL Test Report, combined with our opinions of quality, reliability, and user benefit.

Capacity/expandability is the number one buying issue. It includes cartridge capacity, maximum storage via daisy-chaining drives, and the number and range in size of DOS volumes. An Excellent rating requires a formatted cartridge capacity exceeding 600MB, daisy-chained storage of at least 4GB, and the ability to create a bootable DOS volume.

Setup and installation measures how automatic software installation is as well as the quality of user manuals. To receive an Excellent rating, a unit must come with menu-driven installation software and lucid, illustrated manuals.

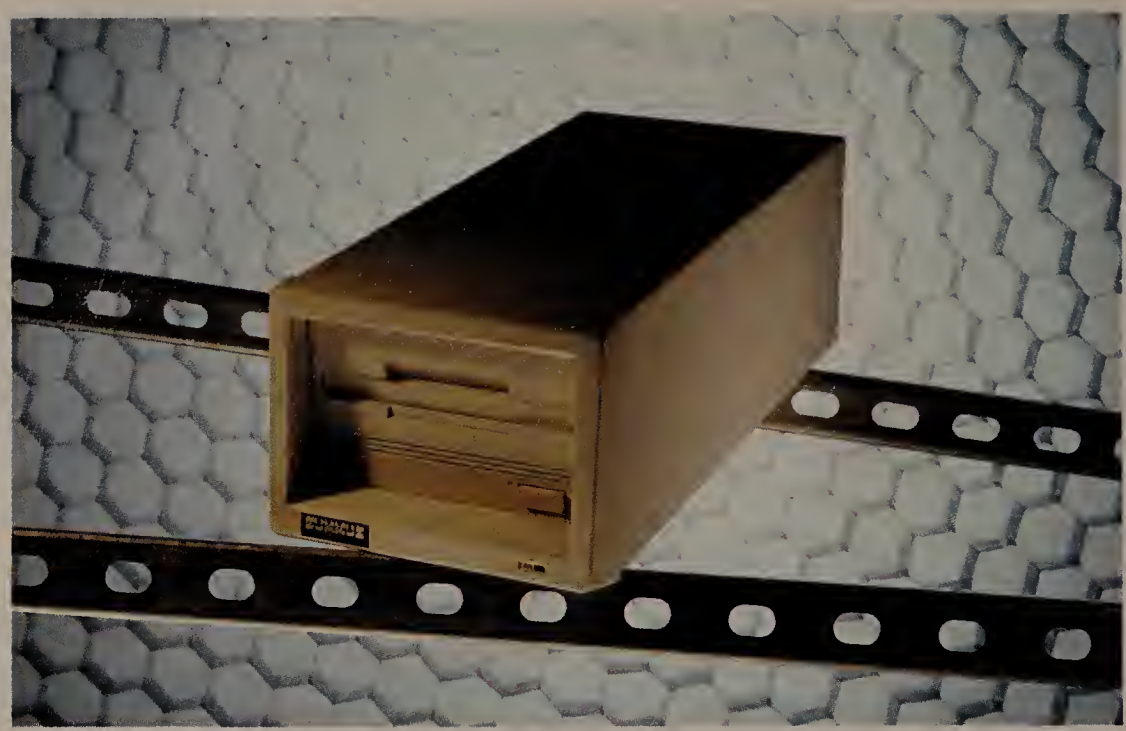
Compatibility refers to a drive's ability to hook up to PCs, Macs, and NetWare servers and to support all DOS commands and applications. An Excellent rating means that the installed drive appears exactly like a hard disk to all software.

Warranty covers the length of warranty, the availability and cost of an extended warranty, whether or not there's a money-back guarantee, and the level of phone support. An Excellent rating is awarded to drives offering a two-year warranty or better, a reasonably priced extended warranty, and unlimited toll-free phone support.

Design refers to quality of construction, durability, shock and MTBF (mean-time-between-failure) ratings, and ease of configuration of SCSI adapters. An Excellent rating is given to durable drives with jumper-free adapters.

Performance is important but is not the overriding factor. An Excellent rating would have been given to any drive performing like a 40ms hard disk—which none did.

Overall value averages all the above criteria, plus price.



Summus's LightDisk is the cheapest drive of the group and cozy with most applications. But sluggish performance and hair-raising installation don't recommend it.

referencing a device driver, rebooting the system, running a confusing menu-driven initialization program, removing the device driver, rebooting again, and then using DOS's FDISK and FORMAT programs. If you want volumes exceeding 32MB, you have to use DOS 4.*x*. It's a needlessly complicated process, and one that isn't spelled out anywhere.

In day-to-day use, the LightDisk is a mix of good and bad. It works with almost any program, but it doesn't support dynamic cartridge switching. So if you want to stick in a different cartridge, you'll have to reboot the system. Note: The drive won't work with any disk defraggers. If you save and erase a lot of files, the LightDisk's performance will lag. As NSTL tests already show, the drive consistently takes third place in performance tests.

If you're considering the LightDisk for a network, hold on. The company says you can plug as many controllers as you want into a PC or server for gigabytes of storage. But the company hasn't tested such a setup. Given the difficulty of installing the drive for DOS—and the company's lack of a NetWare-specific installation kit—network administrators should proceed carefully. And adapter kits for DEC and Sun systems are pricey.

If Summus ever makes good on its plug-and-play claims, the LightDisk could be a bargain. Until then, look elsewhere.

Bright Lights, Big Bargains

Erasable-optical drives aren't hard disk killers—yet. Contemporary EO drives rely on a heavy read/write head that includes a laser, various lenses, and a hard disk–like magnetic read/write head. Superfast optical performance awaits the development of lightweight, integrated fiber optic read/write heads. But there still are storage bargains to be had: The LaserStor and LaserBank drives should be considered by anyone with a serious workstation or network storage problem. Given the alternatives—tape, WORM, or Bernoulli Box—EO units look pretty good. When performance improves and prices plummet, an erasable-optical drive may be the *only* drive you'll need.

Robert Luhn is a senior editor for PC World.

For more information about all products in this article, circle reader service no. 903.

WHERE TO BUY

Alphatronix Inspire
Alphatronix Inc.
2300 Englert Dr., Ste. C
P.O. Box 13687
Research Triangle Park, NC 27709-3687
919/544-0001
LIST PRICE: $7200, dual drive system $13,000; NetWare kit $1500, Macintosh kit $495; 650MB cartridge $250; Bypass $1000 per operating system
WARRANTY: one year
EXTENDED WARRANTY: 10 percent of purchase price per year
TECHNICAL SUPPORT: unlimited, toll number, M–F 8–5
OTHER SUPPORT: none
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MDI LaserBank 600R
Micro Design Int'l, Inc.
6985 University Blvd.
Winter Park, FL 32792
800/228-0891, 407/677-8333
LIST PRICE: $5985; Macintosh kit $295, NetWare kit $595; 650MB cartridge $300
WARRANTY: one year parts and labor
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OTHER SUPPORT: BBS
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Storage Dimensions LaserStor Erasable
Storage Dimensions
2145 Hamilton Ave.
San Jose, CA 95125
408/879-0300
LIST PRICE: $7995; NetWare kit $500, Macintosh kit $295; 1GB cartridge $395, 650MB cartridge $295
WARRANTY: one year parts and labor
EXTENDED WARRANTY: none
TECHNICAL SUPPORT: unlimited, toll-free number, M–F 7–6
OTHER SUPPORT: company BBS, newsletter, training available
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Summus LightDisk SO-600
Summus Computer Systems
17171 Park Row
Houston, TX 77084
800/255-9638, 713/492-6611
LIST PRICE: $5980; 600MB cartridge $250
WARRANTY: one year
EXTENDED WARRANTY: two-year warranty for 10 percent of system cost per year
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ROBERT CARDIN

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Fonts Made Easy

WITH THE RIGHT MIX OF FONTS, TODAY'S LASER PRINTERS CAN DRESS UP EVEN THE DULLEST DOCUMENTS. HERE'S AN EASY-TO-FOLLOW GUIDE TO HELP YOU CHOOSE THE BEST FONT TECHNOLOGY FOR YOUR NEEDS.

ROSS SMITH

News about fonts is everywhere these days, and the news is good. We're seeing a variety of innovative products and technologies that offer easier, relatively low-cost access to high-quality fonts. Hewlett-Packard's new LaserJet offers many PostScript-like capabilities at a significantly lower price; software companies are taking steps to make their programs more "font aware"; and font manufacturers such as Bitstream are developing ways to let you generate fonts of any size from within your favorite application.

Sorting through all the font jargon is no picnic. But making sense of the various font technologies available and selecting the alternative—or combination of alternatives—that best meets your needs can pay off handsomely, in sharp-looking reports and publications that say you mean business.

JOSE CRUZ

BEYOND THE DAISY WHEEL

Considering everything we're doing with laser printers today, it seems strange that the original LaserJet was viewed primarily as a replacement for the slow and noisy daisy wheel printer. It had just one internal character set—a 12-point monospaced (fixed-width) Courier font—and it produced documents that looked like they'd rolled out of a Selectric typewriter.

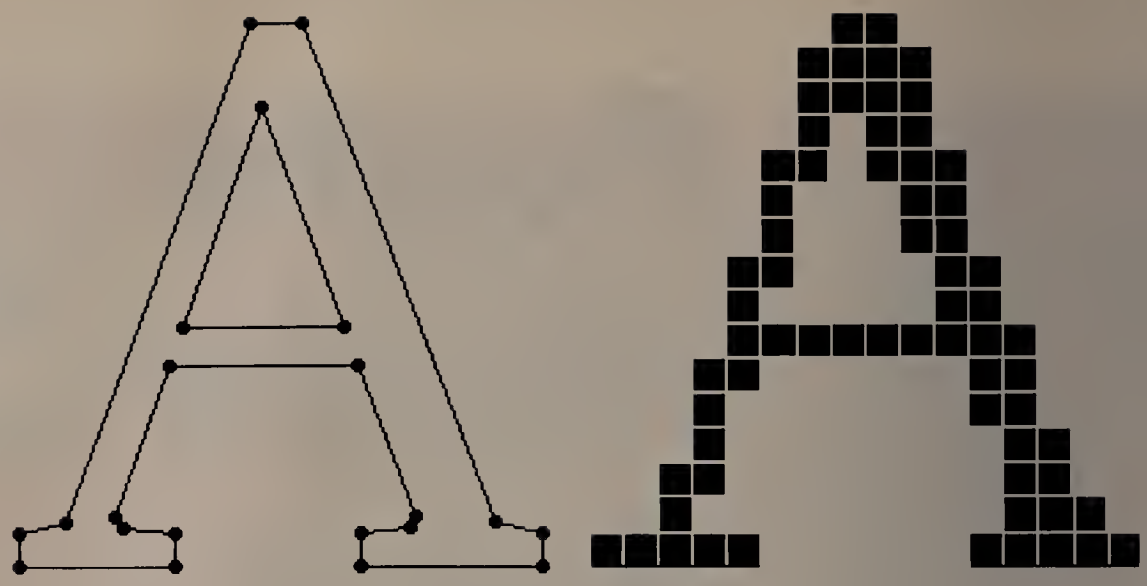
But that first LaserJet did include a feature that made taking one step toward typography simple and relatively inexpensive: It had a slot for ROM cartridges with additional bit-mapped fonts. Cartridge fonts could be accessed just like internal fonts, and they made proportionally spaced type available to PC users for the first time.

HP now offers nearly one dozen font cartridges that accomplish a variety of functions, at prices ranging from $99 to $399 per cartridge. Most of the cartridges contain several monospaced and some proportionally spaced fonts in various sizes and in portrait and landscape orientations. Some cartridges also include math symbols and special characters for creating forms and bar codes.

But HP is only one of many players in the font-cartridge market. In mid-1988 (shortly after the LaserJet Series II debuted with two cartridge slots), IQ Engineering of Sunnyvale, California, turned the cartridge market upside down by coming out with Super Cartridge 1, which packed virtually all of HP's cartridge fonts onto a single cartridge. Pacific Data Products offers a similar product, 25 Cartridges in One. Each of the jumbo cartridges sells for $399, a substantial savings compared to buying the individual HP cartridges. The jumbos are worth the price even if you need only a few fonts.

In response to IQ Engineering's move, even HP has gotten into the jumbo cartridge market, packing 65 fonts on a $300 cartridge in a ProCollection designed for general business printing. These include both monospaced and proportional fonts in portrait and landscape orientation. HP has also combined all of its old cartridges into nine cartridges organized by function (such as word processing or forms), which retail for $199 each. In addition, HP offers a $99 Great Start cartridge for word processing and spreadsheets.

If your needs are limited and you don't anticipate moving into desktop publishing, cartridge fonts may be enough. Installation is a snap (just plug the cartridges into the printer), and software support is widespread. And because the bit maps are stored in ROM, they are as fast as internal fonts. But cartridge fonts have their disadvantages. Font size and variety are limited by memory constraints. Since the largest size available is 30 points, bit-mapped font cartridges are not used for large titles and headlines. And you don't get corresponding screen fonts for an on-screen representation of the printed page.



BIT-MAPPED FONTS (RIGHT) ARE IMMUTABLE IMAGES DESIGNED FOR A SPECIFIC POINT SIZE. SCALABLE OUTLINES SUCH AS THE ONE ON THE LEFT, HOWEVER, USE MATHEMATICAL FORMULAS TO GENERATE FONTS OF ANY SIZE.

HOW POSTSCRIPT SCALING WORKS

Font-scaling technologies use mathematical descriptions of font outlines to determine how characters in a particular typeface will be created in any size. PostScript, the first of this genre, uses the Bézier model.

Bézier outlines are stored internally as 1000-point characters to provide sufficient detail for scaling a font of any size. When a particular point size is requested, the Bézier outline is factored by .001 to return a 1-point font, and then scaled by the PostScript interpreter to the requested size. But it isn't just straight scaling—Adobe has developed "hints" that help its PostScript interpreters produce high-quality type.

Stored internally along with the Bézier outline is other information about the character, such as its width. The PostScript interpreter uses this information to know how to space characters in a string of text. —*R. S.*

SOFTWARE FONTS

Given their limitations, you may find cartridge fonts inadequate for preparing

business documents, particularly if you've begun to move toward desktop publishing. The next option to consider is downloadable software fonts, which come on disk. These were first made possible by the LaserJet Plus, which came with nearly 400K of RAM that could be used for downloading the fonts.

HP's initial software fonts, a $250 collection of Times and Helvetica bit maps, were known as Soft Fonts. They included frequently used sizes in both portrait and landscape orientations: 8-, 10-, and 12-point normal; 10- and 12-point bold and italic; and 18- and 24-point bold. The first third-party supplier, Bitstream, later added three more typeface families, plus a headline package featuring a 30-point font—close to the largest point size that the LaserJet Plus accepts.

Soft Fonts significantly broadened the spectrum of documents that could be produced on the LaserJet and compatible printers. But the added capabilities come at a price: These fonts are trickier to install than cartridges and must be downloaded from your hard disk each time you use the printer, which can be time-consuming. They also eat away at precious hard disk space. And like cartridge fonts, these are bit-mapped, immutable fonts.

Application support for downloadable fonts has improved considerably, and many word processors now include utilities that install and download software fonts automatically. Third-party utilities are also available.

SCALING FONT HEIGHTS

Even with the variety bit-mapped software fonts offer, you may not find everything you need. That's where Bitstream's *Fontware* comes in. *Fontware* was the first product to enable LaserJet users to create font bit maps from scalable typeface outlines, much as Adobe's PostScript page description language does in the Apple LaserWriter and other PostScript printers (although *Fontware* doesn't allow for on-the-fly font scaling). The hardware that made *Fontware* possible was the LaserJet Series II, which has 512K of RAM, expandable to 4.5MB for downloading multiple fonts. With *Fontware* you can generate fonts of any size up to 144 points in 1/10-point increments, depending on the available memory and the application, from scalable typeface outlines supplied on disk. All you need is an installation kit for the application and one of many $195 typeface packages from Bitstream. Once you've selected point sizes for any number of typefaces, *Fontware* generates the portrait and landscape font bit maps for the appropriate character sets. You then save the bit maps on disk for future use.

These typeface packages ordinarily include a complete family of scalable outlines in normal, bold, italic, and—for the first time—bold italic versions, or, alternatively, four decorative headline typefaces. *Fontware* also generates matching screen fonts in the supported applications—a step toward the elusive goal of "what you see is what you get." Bitstream currently offers over 200 typefaces packaged in 50 separate collections, with installation kits for all *Windows* applications, several word processing and desktop publishing applications, Borland's *Quattro*, and Lotus's *1-2-3* release 3 in graphics mode.

Early last year HP announced *Type Director*, a font-management and -scaling technology for LaserJets (as well as some dot matrix printers) codeveloped with Agfa Compugraphic Corporation. *Type Director* is based on Compugraphic's Intellifont font-scaling technology, which is similar to the original *Fontware*. *Type Director* scales fonts up to 200 points in ½-point increments and does it faster than *Fontware*. *Type Director* is supported by fewer fonts, though, since the *Fontware* library enjoys a two-year head start.

By midyear, supported applications should include *Ventura Publisher*, *PageMaker*, *WordPerfect*, *Microsoft Word*, *Word for Windows*, *Excel*, *Manuscript*, *MultiMate* (with a print enhancement package), *XyWrite*, *WordStar*, and *1-2-3*.

A few words of caution about these font-generating packages and their peers: Cre-

MAKING SENSE OF FONT JARGON

TYPEFACE The design of a set of alphanumeric characters, such as Times Roman.

FONT A set of characters of a particular style and size generated from a typeface design, such as 12-point Times Roman bold. Fonts are either bit-mapped (immutable) images, or formed from outlines that are scaled to size before printing. Software fonts are sold on floppy disks and stored on a hard disk. Cartridge fonts are plugged into a slot in the printer.

BIT-MAPPED FONTS Fonts that are sold—either in cartridges or on disks—in fixed point sizes.

SCALABLE FONTS Fonts stored in an outline form for later conversion into bit maps of any size before printing.

MONOSPACED TYPE Fixed-space (as on a typewriter) characters; early font cartridges offered only monospaced type.

PROPORTIONALLY SPACED TYPE Type spaced according to the width of each character, so that an *I*, for example, would take up less space than a *W*.

WYSIWYG "What you see is what you get." WYSIWYG refers to an exact on-screen representation of the printed page. WYSIWYG has yet to be fully attained, however, since the printer and the screen have different resolutions and imaging models.

FONT OPTIONS AT A GLANCE

Cartridge Fonts

Bit-mapped or scalable typeface outline fonts that plug into the printer. Cartridge fonts are fast, easy to install, and supported by all software that works with the printer. The bit-mapped versions are limited by available memory, however, in both typefaces and sizes, and they are comparatively expensive per font.

Software Fonts

Bit-mapped fonts provided on floppy disks and transferred to the hard disk. Software (or downloadable) fonts are fast, and they offer a greater variety of typefaces than cartridges do. Prices range from $15 for a single typeface to nearly $300, depending on the typeface and the vendor. Software fonts can be tricky to install, however, and must be downloaded to the printer, which can be a time-consuming process. Software support is not as straightforward as with cartridges.

Font Generators

Software fonts stored in outline form, such as Bitstream's *Fontware* and HP's *Type Director*. Their advantage: They can be scaled to any point size. Screen fonts are also generated. Sold in sets of four, outlines average about $195. The drawbacks: You must choose the fonts you'll need and generate them before entering your application, font generation takes time, and the completed fonts eat up hard disk space. Also, neither *Fontware* nor *Type Director* is available for all applications.

ating high-quality bit maps, with accompanying screen fonts and font-width information, can take several minutes for each character—and up to several hours for a complete typeface family, depending on both the number and the size of the fonts selected.

You pay another price for versatility: A typical typeface family can require 5MB or more of hard disk space, even if you select only the most common sizes. The problem is compounded when you need to store both portrait and landscape bit maps. Both *Fontware* and *Type Director* allow you to produce reduced character sets (such as only uppercase letters) to conserve storage space, which is particularly useful when you're dealing with large point sizes. But, if you scrimp on the initial selection to save disk storage space and then need an odd size for a particular requirement, generating and installing the character set will be both cumbersome and time-consuming.

Despite the drawbacks, scalable typeface outlines are the most cost-effective solution if you require a wide variety of point sizes. You're paying for variety rather than higher-quality output, however. The prepackaged fonts generally offer slightly better print quality since they are optimized for a specific point size.

THE LASERJET III'S SCALABLE FONTS

With the unveiling of the LaserJet III (see "HP's Earthshaking, Ground-Breaking LaserJet III," April 1990), HP introduced PCL 5, its next-generation printer control language that includes Intellifont technology for internal font scaling. This advance lets users generate almost any size font *on demand* from typeface outlines stored in printer ROM.

If your application supports PCL 5, you can access font-scaling features from within your application. Packages that incorporate Intellifont will also provide LaserJet III users with an on-screen approximation of printer fonts. Virtually all major software developers have declared their intention to support PCL 5 in upcoming releases of their applications.

The LaserJet III's internal typeface outlines are the equivalent of Times and Helvetica in the four basic styles. (Internal Courier fonts are still bit maps.) The LaserJet III can scale its CG Times and Univers Intellifont outlines in sizes up to 999.75 points in increments of ¼ point.

The LaserJet III with PCL 5 lets you produce many special font effects. These include shadowing, mirroring, reversing out white text on black, filling text with patterns or shades of gray, overlaying text in either opaque or transparent mode, and printing text in portrait and landscape orientation on the same page. The LaserJet III also includes HP's impressive Resolution Enhancement Technology, which dramatically improves the definition of both text and graphics over normal 300-dot-per-inch output.

Two cartridges of scalable typeface outlines are available for the LaserJet III—one with 25 and one with 26 additional typefaces in six families—an economical and viable alternative to adding fonts from software.

HP isn't the only vendor to bring font-scaling technology to the printer. Canon's next-generation printers, the Mark III and the 4-page-per-minute LBP-4, offer many comparable features. And in the coming months we're likely to see more competing products from other manufacturers whose laser printers are based on the Canon engine.

POSTSCRIPT: MOVING TO THE HIGH GROUND

In terms of sheer publishing power, LaserJets have been chasing PostScript ever since the first desktop PostScript device, Apple's LaserWriter, debuted in 1986. The LaserJet III comes the closest yet, and its many advanced features should more than

PCL 5

You don't buy PCL 5; it's the printer control language built into HP's new LaserJet III. PCL 5 provides many of PostScript's capabilities at a lower cost. It offers font scaling on line, and the printer includes eight internal typefaces. Special font and graphics effects are possible through application software. Packages supporting Intellifont will offer screen fonts. As a new technology, however, it's just beginning to receive third-party software and font support.

PostScript

Adobe's page-description language with matching screen fonts. PostScript printers come with 35 built-in fonts and provide sophisticated graphics functions. The *Adobe Type Library* adds a wide array of high-quality fonts, and non-Adobe typeface outlines are available from other vendors, such as Bitstream. All the major applications include PostScript drivers. But a printer with PostScript capabilities is slower and generally more expensive than a standard laser printer—factors that have limited PostScript's use.

Speedo

Bitstream's next-generation font-scaling technology, which will be incorporated into everything from applications to operating systems to monitors and printers. It will feature matching screen and printer fonts. Speedo is fast, supports a range of graphics functions, and is inexpensive, since it isn't sold as a stand-alone product. Few developers, however, have announced Speedo products.

satisfy most business users. But if your needs demand PostScript, HP offers an Adobe PostScript cartridge ($695, plus $495 for additional memory) that includes the 35 standard Adobe scalable typeface outlines found in the LaserWriter Plus.

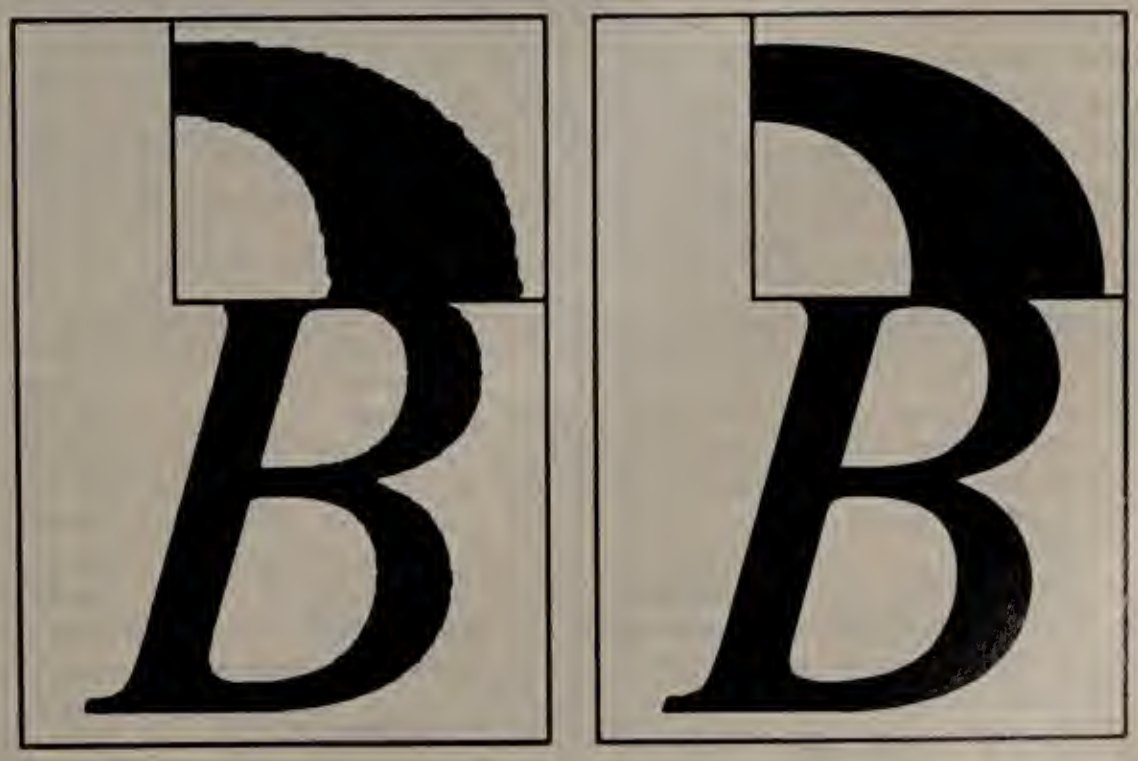
Whether you buy a PostScript cartridge or a full-blown printer, PostScript is the ultimate solution for companies with sophisticated typographical needs. With PostScript, text is treated as a graphic element that can be scaled to any size, rotated in any orientation, stretched, skewed, reflected, shadowed, filled with any pattern, outlined, reversed out, or printed in any shade of gray.

One of the most attractive features of PostScript printers is that they have 35 fonts built in. Many users get along quite well without having to buy anything more. But if you do outgrow the built-in fonts, the *Adobe Type Library* offers a wide selection of high-quality designs.

PostScript isn't for everyone, however. Compared to standard laser printers, PostScript printers can be expensive, particularly if you choose to add a controller to speed up performance. Though software support is now commonplace among the major applications, there are still categories of products, such as the vast majority of accounting packages, that have yet to offer PostScript drivers. (You can, however, print non-PostScript files on a PostScript printer with utilities like *Printer Control Panel* from LaserTools.) To further complicate buying decisions, numerous "PostScript-compatible" printers and fonts have hit the market. These often are competitive in features and aggressively priced, but total compatibility with Adobe PostScript isn't a sure thing.

OTHER SCALABLE-FONT SOLUTIONS

Even if you're not planning to buy a new printer in the near future, you'll soon have access to scalable font technology. Bitstream's Speedo font-scaling technology, which the company claims is one-fifth the size and has five times the speed of *Fontware*, will be embedded in operating systems, applications, PC add-in boards, monitors, printers, and even fax machines.



THE ILLUSTRATIONS ABOVE HIGHLIGHT THE DIFFERENCE BETWEEN TEXT PRINTED WITHOUT HP'S NEW RESOLUTION ENHANCEMENT TECHNOLOGY (LEFT) AND WITH IT.

SCREEN FONTS GENERALLY OFFER USERS ONLY AN APPROXIMATION OF WHAT THE FINAL PRINTED OUTPUT WILL LOOK LIKE. THE EXAMPLE ABOVE SHOWS A SCREEN FONT CREATED IN WINDOWS 2.1 (LEFT) AND THE CORRESPONDING PRINTED FONT.

Although you won't ever buy Speedo, its capabilities will begin showing up in applications this year, starting with *Micrografx Designer 3.0.* Speedo not only provides on-the-fly font scaling from within applications but also supports such character transformations as rotation to any angle, obliquing, and mirror imaging over a wide range of point sizes.

We are also beginning to see on-the-fly font-scaling solutions from other vendors such as Atech and SWFTE, which offer competitively priced font-scaling drivers for major desktop publishing and word processing applications. Atech's *Publisher's Powerpak*, the first of this new breed of font scalers, provides an intelligent driver that creates fonts from 6 to 1000 points (depending on the application) together with the Times, Helvetica, and Courier typeface families. It's priced at $79.95. Individual typeface outlines, either proprietary or from Monotype, are available for $29.95 and $79.95, respectively.

THE SPECIAL CASE OF WINDOWS

One of the principal advantages of using fonts in the *Windows* environment is that you need to install them only once: Fonts installed for *Windows* can be accessed by any application that uses *Windows*' standard font routines.

Because *Windows* is a bit-mapped graphics environment, however, you must install both screen and printer fonts in order to get on-screen approximation of the output.

But the *Windows* picture is changing, too. Microsoft has announced that *True-Type*, the display font technology Microsoft has codeveloped with Apple, will be incorporated into *Windows* as the standard font mechanism by the end of the year (see this month's *Industry Outlook*). Adobe, for its part, has said that *Adobe Type Manager* will also be available for *Windows* in 1990.

A TURNING POINT

The widespread availability of scalable-font technology in printers, cartridges, and software applications marks a turning point for PC users in the types of documents they can produce and the ease with which they can create them.

Your needs may not dictate moving to one of the latest technologies right away, in which case font cartridges and bit-mapped software fonts may do the trick. But as more and more advanced capabilities become available in a variety of formats, nearly everyone will want to take advantage of the chance to create more sophisticated and professional-looking documents.

Ross Smith is a freelance writer and an electronic publishing consultant. His latest book, Learning PostScript: A Visual Approach, *is available from Peachpit Press.*

For more information about all products in this article, circle reader service no. 902.

WHERE TO BUY

Adobe Type Library
Adobe Systems, Inc.
1585 Charleston Rd.
P.O. Box 7900
Mountain View, CA 94039
415/961-4400
LIST PRICE: $85–$370
Reader service no. 605

Fontware
Bitstream Inc.
Athenaeum House
215 First St.
Cambridge, MA 02142
800/522-3668, 617/497-6222
LIST PRICE: $195 per typeface package
Reader service no. 606

Great Start Cartridge, ProCollection
Hewlett-Packard Company Inquiries
19310 Pruneridge Ave.
Cupertino, CA 95014
800/752-0900
LIST PRICE: $99, $300
Reader service no. 607

Printer Control Panel
LaserTools Corp.
1250 45th St. #100
Emeryville, CA 94608
800/767-8004, 415/420-8777
LIST PRICE: $149
Reader service no. 608

Publisher's Powerpak
Atech Software
5964 La Place Ct. #125
Carlsbad, CA 92008
800/748-5657, 619/438-6883
LIST PRICE: $79.95
Reader service no. 609

Super Cartridge 1
IQ Engineering
685 N. Pastoria Ave.
Sunnyvale, CA 94086
800/765-3668, 408/733-1161, 408/733-2585 (fax)
LIST PRICE: $399
Reader service no. 610

25 Cartridges in One
Pacific Data Products
6404 Nancy Ridge Dr.
San Diego, CA 92121
619/552-0880
LIST PRICE: $399
Reader service no. 611

Type Director 2.0
Hewlett-Packard
LIST PRICE: $40 (does not include typefaces)
Reader service no. 612

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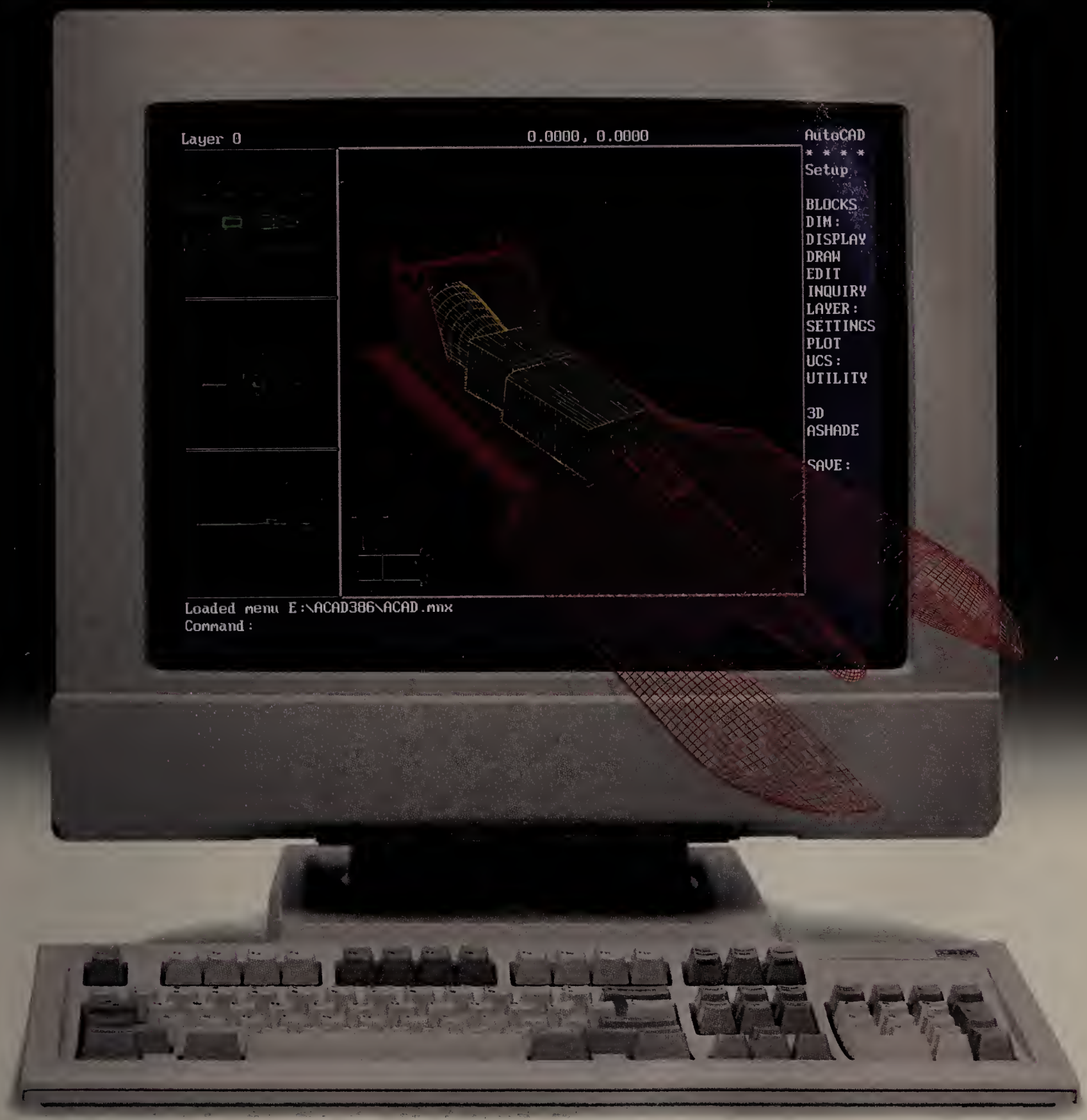

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KEYBOARDS, MICE, AND TRACKBALLS

WITH THE PERSONAL TOUCH

SUSAN L[illegible] ND LINCOLN [illegible]

A HANDS-ON SELECTION OF AGILE INPUT DEVICES TO MAKE YOUR PC MORE RESPONSIVE

There's nothing more personal about a personal computer than its input device. How you communicate with your PC has a direct impact on your productivity. This guide focuses on the devices used to drive most business applications: keyboards, mice, and trackballs. If you're looking to replace your keyboard, or if you're moving up to a graphic interface like *Windows* and need a good pointing device, you'll find plenty of options in the accompanying tables.

Since input devices are available from a wide variety of vendors, price and warranty may be your biggest considerations. But some of the most important criteria are personal. A keyboard that feels responsive to one user may seem mushy to someone else. A mouse that fits one person's hand perfectly may feel like a brick in another's. Since there's no way to measure these qualities objectively, be sure to test any device before you buy. Here's what to look for.

KEYBOARDS

Aside from personal preference, the keys to keyboard shopping are hardware compatibility, a convenient layout, and added functions. All the products in the keyboards table work with ATs, 386s, and PS/2s (some vendors charge extra for the PS/2's adapter). List prices range from $50 to $350, but good keyboards should be available for street prices under $100. All employ the usual QWERTY key setup, and most conform to the AT's original 84-key format or enhanced 101-

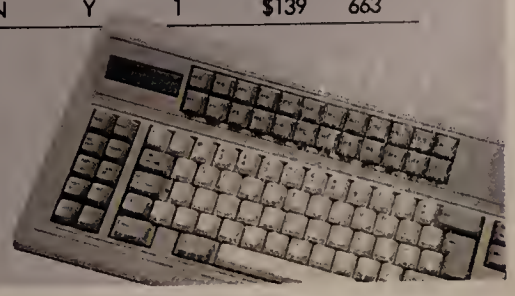
KEYBOARDS: FEEL AND FUNCTIONALITY ARE KEY

Y= yes N= no

COMPANY Product	Number of keys	Number of function keys	Placement of function keys	Footprint (inches)	Built-in input device	PS/2 adapter	XT/AT switch	<Ctrl>/ <Caps Lock> switch	LED indicators on keys	L-shaped <Enter> key	Warranty (years)	Price	Reader service number
ALPS AMERICA													
ALPS SM101	101	12	top	1.7×19.2×7.8	N	Y[1]	N	Y	N	N	3	$110	655
CHERRY ELECTRICAL PRODUCTS													
G80-1800	101	12	top	1.4×15.9×7.1	N	Y	Y	N	N	N	1	$122	656
G81-3000	101	12	top	1.5×18.5×7.7	N	Y	Y	N	N	N	1	$99	656
G80-1600	103	12	top	1.4×19.1×8.2	Y[2]	Y	Y	N	N	N	1	$243[3]	656
G80-2100	123	33	top/side	1.7×21.3×8.5	N	Y	Y	N	Y	Y	1	$300	656
CHICONY AMERICA													
KB-5161/KB-5162	101/102	12	top	1.6×19×8	N	Y[1]	Y	N	N	Y	3	$62	657
KB-5191/KB-5192	101/102	12	top	1.3×19×7.7	N	Y[1]	Y	N	N	Y	3	$50	657
KB-5581/KB-5582	101/102	12	top	1.6×19×7.7	Y[4]	Y[1]	Y	N	N	Y	3	$90	657
DATADESK INT'L													
Switchboard	101	12	top/side[5]	1.5×18.8×7.7	N[1]	Y	Y	Y	Y	N	2	$240	658
Turbo 101	101	12	top	1.5×18.3×8.3	N	Y[1]	Y	Y	N	Y	2	$170	658
HONEYWELL													
84RX	84	10	side	1.5×18.7×7.6	N	Y	Y	N	N	Y	3	$119	659
101RXE	101	12	top	1.5×19.4×8.3	N	Y[1]	Y	Y	N	Y	3	$149	659
101RX	101	12	top	1.5×19.4×8.3	N	Y	Y	Y	N	N	3	$149	659
JAMECO ELECTRONICS													
JE2016	111	12	top	1.5×19.5×7.6	N	Y[1]	Y	Y	N	Y	1	$80	660
JE2017	104	12	top	1.7×18.6×7.5	Y[4]	Y[1]	Y	N	N	Y	1	$100	660
KEYTRONIC													
KB5153	87	10	top	1.6×20.2×8.6	Y[6]	Y[1]	Y[7]	N	Y	Y	1	$249	661
KB3270 PLUS	122	24	top/side[5]	2.3×20.9×8.4	N	Y[1]	Y	N	Y	Y	3	$349	661
KB101 PLUS	101	12	top	1.8×19×8.1	N	Y[1]	Y	Y	Y	Y	3	$149	661
KB5184WP	84	10	side	1.6×17.7×7.6	N	Y[1]	Y	N	Y	Y	3	$119	661
KB101	101	12	top	1.8×19×8.1	N	Y[1]	Y	N	N	N	3	$139	661
MEI													
Microtype	100	12	top left	2.6×10.8×6	N	Y	Y	N	N	N	1	$125	662
OCTAVE SYSTEMS													
KeyTrak	96	12	top	1.4×19×8	Y[4]	Y	Y	N	N	Y	1	$139	663

1 Available at extra cost.
2 Built-in bar coder.
3 Bar code stylus $86.50 extra.
4 Built-in trackball.
5 User configurable.
6 Built-in tauchpad.
7 A jumper, not a switch.

For more information about all products in this table, circle reader service no. 904.



PIERRE-YVES GOAVEC

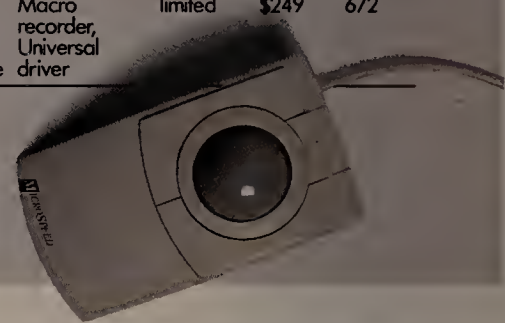
TRACKBALLS: SPACE-SAVING ALTERNATIVES TO DESKTOP RODENTS

Y=yes N=no

COMPANY Product	Number of buttons	Diameter of trackball (inches)	Resolution (dpi)	Dynamic acceleration	User-adjustable speed/sensitivity	Uses Microsoft drivers	Number of other drivers available	Operating mechanism	Compatibility Serial	PS/2	AT	Bundled software	Utilities available	Warranty	Price	Reader service number
CH PRODUCTS																
RollerMouse	4	2.3	100/200/400	Y	Y[1]	Y	0	opto-mechanical	Y	Y	Y	Roller-mouse Software	pop-up menus	1 year	$150–$196[2]	664
EVERGREEN SYSTEMS																
Diamand 24	3	1.5	400	Y	N	Y	0	aptical	Y	Y	Y	none	none	1 year	$168	665
Diamand 20	4	2	400	Y	Y	Y	0	optical	Y	Y	Y	none	none	1 year	$365	665
ITAC SYSTEMS																
Mouse-trak	2	2	200	Y	Y[3]	N	1	opta-mechanical	Y	Y	Y	Amenu Software	pop-up menus	1 year	$169	666
Mouse-trak	3	2	200	Y	Y[3]	N	1	opta-mechanical	Y	Y	Y	Amenu Software	pop-up menus	1 year	$179	666
KENSINGTON MICROWARE																
Expert Mouse	2	2.3	200[4]	Y	N	Y	4	opto-mechanical	N	Y	N	none	Expert Menus	1 year	$170	667
LOGITECH																
TrackMan Statianary Mouse	3	1.4	300	Y	Y	N	1	opto-mechanical	Y	N	Y	Mouse-ware	Logimenus	limited lifetime[5]	$149–$169[6]	668
MICROSPEED																
PC-Trac	3	2.3	200	Y	Y	N	2	opta-mechanical	Y	Y	Y	Precision Pointer	KeyMap pop-up menus	1 year	$119–$149[7]	669
FastTrap	3	2.3	200	Y	Y	N	2	opta-mechanical	Y	N	Y	Precision Pointer	KeyMap pop-up menus	1 year		669
MOUSE SYSTEMS																
PC Trackball	3	1.5	200	Y	Y[8]	Y	1	opta-mechanical	Y	N	Y	Presen-tation Magician	Designer Pop-Up, 1-2 Click, Develaper's Toolkit	1 year	$119	670
PENNY + GILES																
TrackerMouse 2		1.5	400	Y	N	Y	1	aptical	Y	Y	N	PG-Mouse	none	1 year	$99	671
TrackerMause 16[9] Plus		1.5	400	Y	N	Y	1	aptical	Y	Y	N	PG-Mouse	Keyball pop-up menus	1 year	$199	671
PROHANCE TECHNOLOGIES																
PowerMouse 40 100		2.25	200	Y	Y	Y	4	opta-mechanical	Y	N	N	Power-Mouse 100 Software	Macro recorder, Universal driver	limited	$249	672

1 By DIP switch only.
2 For an AT part $150, far a serial ar PS/2 part $196.
3 By buttan located an the mause.
4 CPI (caunts per inch).
5 Repair ar replacement free far first year but may cast extra thereafter.
6 Far a serial part $149, for an AT part $169.
7 For a serial ar PS/2 part ar for a Micrasaft Inpart card $119, far an AT part $139, far a serial port $149.
8 Adjustable in the driver anly.
9 Can be custamized up ta 32 buttans.

For more information about all products in this table, circle reader service no. 905.



key layout.

The 84-key model features 10 function keys on the left and a combined numeric-cursor keypad; the 101-key unit offers 12 function keys along the top and an extra cursor keypad. The 101 also swaps the positions of <Ctrl> and <Caps Lock>—bad news for users with *WordStar*-trained fingers. Fortunately, some keyboards come with switches that swap them back. Other features to look for include LED indicators on the <Num Lock> and <Caps Lock> keys and an L-shaped <Enter> key.

Some keyboards have unusual layouts, offering a built-in trackball or touchpad, or programmable function keys for emulating an IBM 3270 terminal. And Datadesk's Switchboard lets you customize your keyboard, offering plug-in modules for numeric, alpha, and function keys.

MICE

When it comes to desktop vermin, the Microsoft Mouse is the big cheese—making compatibility with Microsoft drivers essential. Other key factors are device resolution and software bundling deals.

All the products in the mice table are compatible with Microsoft's two-button rodent and should work with programs like *Windows*, *Ventura Publisher*, and *PC Paintbrush*. Several vendors also provide their own software drivers, adding support for features like a third button.

All the mice offer resolutions between 100 and 400 dots per inch (dpi). Generally, you must drag a 200-dpi mouse twice as far as a 400-dpi device to move the pointer the same distance. But acceleration and sensitivity also affect pointer movement. Most mice feature *dynamic acceleration:* The faster you move the mouse, the farther the pointer moves. More important is the ability to adjust *sensitivity*, the ratio between mouse movement and pointer movement. Nudge a highly sensitive mouse and the pointer flies across the screen; cranking down the sensitivity lets you do precise work.

Mice come with a variety of software—from utilities that add pulldown menus to non-mouse programs to applications like *PC Paintbrush*, *EasyCAD*, and *Windows*. Consider the bundling deals before you buy.

GETTING IN TOUCH

Sometimes the best pointing device is also the most natural: your finger. Touch screens are flexible, easy-to-use devices that give you fingertip control over applications.

Put simply, a touch screen lets you select, drag, or draw with an on-screen object by putting your finger on the object and moving it. Because few applications support touch screens directly, most of these devices include drivers that mimic mice or keyboards. Touch-screen vendors like Carroll Touch, Edmark, and Elographics offer drivers for the Microsoft Mouse and *Microsoft Windows* as well as programmers' tools that let you add touch-screen interfaces to your applications.

Though touch screens are used primarily in factories, where keyboards or mice are impractical, they're also ideal for retail, public information, and other applications that require an easily mastered interface. Touch screens are costly (from $350 to $3500) and require a lot of customizing, but there's no way to get closer to your PC. —*L. S.*

MICROSOFT-COMPATIBLE MICE: INPUT DEVICES WITH A POINT

Y=yes N=no

COMPANY Product	Number of buttons	Resolution (dpi)	Dynamic acceleration	User-adjustable speed/sensitivity	Uses Microsoft drivers	Number of other drivers available	Operating mechanism	Parts: Serial	Parts: PS/2	Parts: AT	Bundled software	Utilities available	Warranty	Price	Reader service number
DFI DMS-200H	3	200	Y	N	N	2	opto-mechanical	Y	N	Y	Bit Paint	Menuscript	1 year	$60	673
GVC TECHNOLOGIES LiteMouse	3	100, 250, 500[1]	Y	Y	N[2]	2	optical	Y	N	N	Dr. Halo Paint, Dr. Halo Graph	none	5 years	$70	674
IMCS Mouse Pen	2	50–1000[3]	Y	Y[4]	N	0	opto-mechanical	Y	Y	N	TelePaint	MenuMaker	1 year	$129	675
KEYTRONIC Key Tronic Professional Series Mouse	2	200	N	Y	N	0	mechanical	Y	Y	Y	Key Tronic Software	Pop-Up 1-2-3 Custom Menu Toolkit[5]	1 year	$119	676
KYE INT'L GM-6X	3	200	Y	Y	N	0	opto-mechanical	Y	N	N	Dr. Halo III	none	lifetime	$49	677
GM-6000	3	350	Y	Y	N	0	opto-mechanical	Y	N	N	Dr. Genius	MenuMaker, Menu Library	lifetime	$79	677
GM-S2	2	350	Y	Y	N	0	opto-mechanical	N	Y	N	Dr. Halo III	MenuMaker, Menu Library	lifetime	$79	677
GM-F301	3	350	Y	Y	N	0	opto-mechanical	Y	N	N	Dr. Genius	MenuMaker, Menu Library	lifetime	$99	677
LOGITECH Series 9 Mouse	3	320	Y	Y	N	1	opto-mechanical	Y	Y	Y	Mouseware, Pop-Up DOS, Paintshaw Plus	Click Mouse, Mouse 2-3, Logimenus	limited lifetime[6]	$109–$149[7]	678
MAGITRONIC Procorp Mouse	2	400	N	Y	N	0	mechanical	Y	Y	Y	Dr. Halo III	none	lifetime	$49–$59[8]	679
MICROSOFT Mouse/Microsoft Paintbrush	2	400	Y	Y	Y	0	mechanical	Y	Y	Y	Paintbrush	Mouse Menus	limited lifetime[6]	$150	680
Mouse/Windows Graphical Environment	2	400	Y	Y	Y	0	mechanical	Y	Y	Y	Windows 3.0	Mouse Menus	limited lifetime[6]	$225	680
MOUSE SYSTEMS PC Mouse II	2	200	Y	Y	Y	2	optical	Y	N	Y	PC Paint Plus	DOS Shell, 1-2 Click	lifetime	$149	681
OmniMouse II	2	200	Y	Y	Y	2	opto-mechanical	Y	N	N	PC Paint Plus	DOS Shell, 1-2 Click	lifetime	$80	681
White Mouse	3	350	Y	Y	Y	2	opto-mechanical	Y	N	Y	PC Paint Plus, Power Panel	DOS Shell, 1-2 Click	lifetime	$119	681
NUMONICS Manager Mouse	3	200	Y	N	Y	0	opto-mechanical	Y	N	N	KeyFree, CADD Package[5]	Menu System	limited lifetime[6]	$105	682
Manager Mouse (cordless)	3	200	Y	N	Y	0	opto-mechanical	Y	N	N	KeyFree, CADD Package[5]	Menu System	limited lifetime[6]	$175	682

1 Hardware switchable.
2 Own drivers included.
3 Ballistic resolution only.
4 Adjustable in the driver only.
5 Available at extra cost.
6 Repair or replacement free for first year but may cost extra thereafter.
7 For a PS/2 port $109, for a serial port $119, for an AT port $139, for a PS/2 serial port $149.
8 For an XT or an AT port $49, for a serial port $59.

For more information about all products in this table, circle reader service no. 906.

PIERRE-YVES GOAVEC

Other factors like operating mechanisms are less crucial. Mechanical and optomechanical mice measure the movement of the mouse ball over a surface; optical mice use light sensors that detect when lines are crossed on the mouse pad. While optical devices stay cleaner than mechanical ones, they require a special mouse pad, which soaks up more desk space. Users looking for a truly unique desktop pet should consider the Mouse Pen, a cigar-shaped device from IMCS.

TRACKBALLS

A trackball is essentially an upside-down mouse: The mouse ball sits in a socket on top of a stationary device. Instead of rolling the device across your desk, you move the mouse ball with your fingers—a real space saver for crowded desktops.

As with the mice, all the products in the trackballs table are Microsoft compatible and range from 100 to 400 dpi. All offer dynamic acceleration, and most come bundled with software. Other features to consider are the size of the mouse ball (larger is generally better) and accessibility of buttons. More unusual specimens include ProHance Technologies' PowerMouse 100, which comes with 40 buttons for creating macros.

LEFT TO YOUR OWN DEVICES

Some input devices can't be easily categorized and therefore don't appear in the tables. Hand-held keyboards like Forte's Remote Keyboard and Presentation Electronics' SilentPartner let you control a PC from across the room. Users seeking a more hands-on approach may want to invest in a touch screen (see the sidebar "Getting in Touch"). No matter which kind you choose, your input device can make a big difference in the way you work.

Susan Lusty and Lincoln Spector are assistant editors for PC World.

WHERE TO BUY

Alps America
3553 N. First St.
San Jose, CA 95134
408/432-6000,
408/432-6035 (fax),
408/432-6037 (fax)

Carroll Touch
P.O. Box 1309
811 Paloma Dr.
Round Rock, TX 78680
512/244-3500,
512/244-7040 (fax)

Cherry Electrical Products
3600 Sunset Ave.
Waukegan, IL 60087
708/662-9200,
708/662-2990 (fax)

Chicony America
111 Corporate Blvd.,
Ste. H
South Plainfield, NJ
07080
201/756-7300

CH Products
970 Park Center Dr.
Vista, CA 92083
800/624-5804,
800/262-2004
California,
619/598-2518,
619/598-2524 (fax)

Datadesk Int'l
9314 Eton Ave.
Chatsworth, CA 91311
800/826-5398,
800/592-9602
California,
818/998-0330 (fax)

DFI Inc.
2544 Port St.
West Sacramento, CA
95691
916/373-1234,
916/373-0221 (fax)

Edmark Corp.
P.O. Box 3903
Bellevue, WA
98009-3903
800/426-0856,
800/422-3118
Washington,
206/746-3900,
206/746-3962 (fax)

Elographics
105 Randolph Rd.
Oak Ridge, TN 37830
615/482-4100,
615/482-4943 (fax)

Evergreen Systems
31336 Via Colinas
Westlake Village, CA
91362
818/991-7835,
818/991-4036 (fax)

Forte Communications
1050 E. Duane Ave.,
Ste. J
Sunnyvale, CA 94086
408/733-5100

GVC Technologies
99 Demarest Rd.
Sparta, NJ 07871
800/289-4821,
201/579-3630,
201/579-2702 (fax)

Honeywell Keyboard Division
4171 N. Mesa, Bldg. D
El Paso, TX 79902
800/445-0939,
915/543-5581,
915/543-5526 (fax)

IMCS, Inc.
1332 Vendels Cir.
Paso Robles, CA
93446
800/448-1184,
805/239-8976,
805/239-8978 (fax)

ITAC Systems, Inc.
3121 Benton St.
Garland, TX 75042
800/533-4822,
214/494-3073,
214/494-4159 (fax)

Jameco Electronics
1355 Shoreway Rd.
Belmont, CA 94002
415/592-8097,
415/592-2503,
415/595-2664 (fax)

Kensington Microware Ltd.
251 Park Ave. S
New York, NY 10010
800/535-4242,
212/475-5200,
212/475-5996 (fax)

Key Tronic Corp.
P.O. Box 14687
Spokane, WA
99214-0687
509/928-8000,
509/927-5248 (fax)

KYE Int'l Corp.
12675 Colony St.
Chino, CA 91710
800/456-7593,
714/590-3940,
714/590-1231 (fax)

Logitech, Inc.
6505 Kaiser Dr.
Fremont, CA 94553
415/785-8500,
415/792-8901 (fax)

Magitronic Corp.
10 Hub Dr.
Melville, NY 11747
800/227-5454,
516/454-8255,
516/454-8268 (fax)

MEI
461 Carlisle Dr.
Herndon, VA 22070
800/782-7177,
703/435-9496

Microsoft Corp.
One Microsoft Way
Redmond, WA
98052-6399
800/426-9400,
206/882-8080,
206/883-8101 (fax)

MicroSpeed
44000 Old
Warm Springs Blvd.
Fremont, CA 94538
800/232-7888,
415/490-1403,
415/490-1665 (fax)

Mouse Systems
47505 Seabridge Dr.
Fremont, CA 94538
415/656-1117,
415/656-4409 (fax)

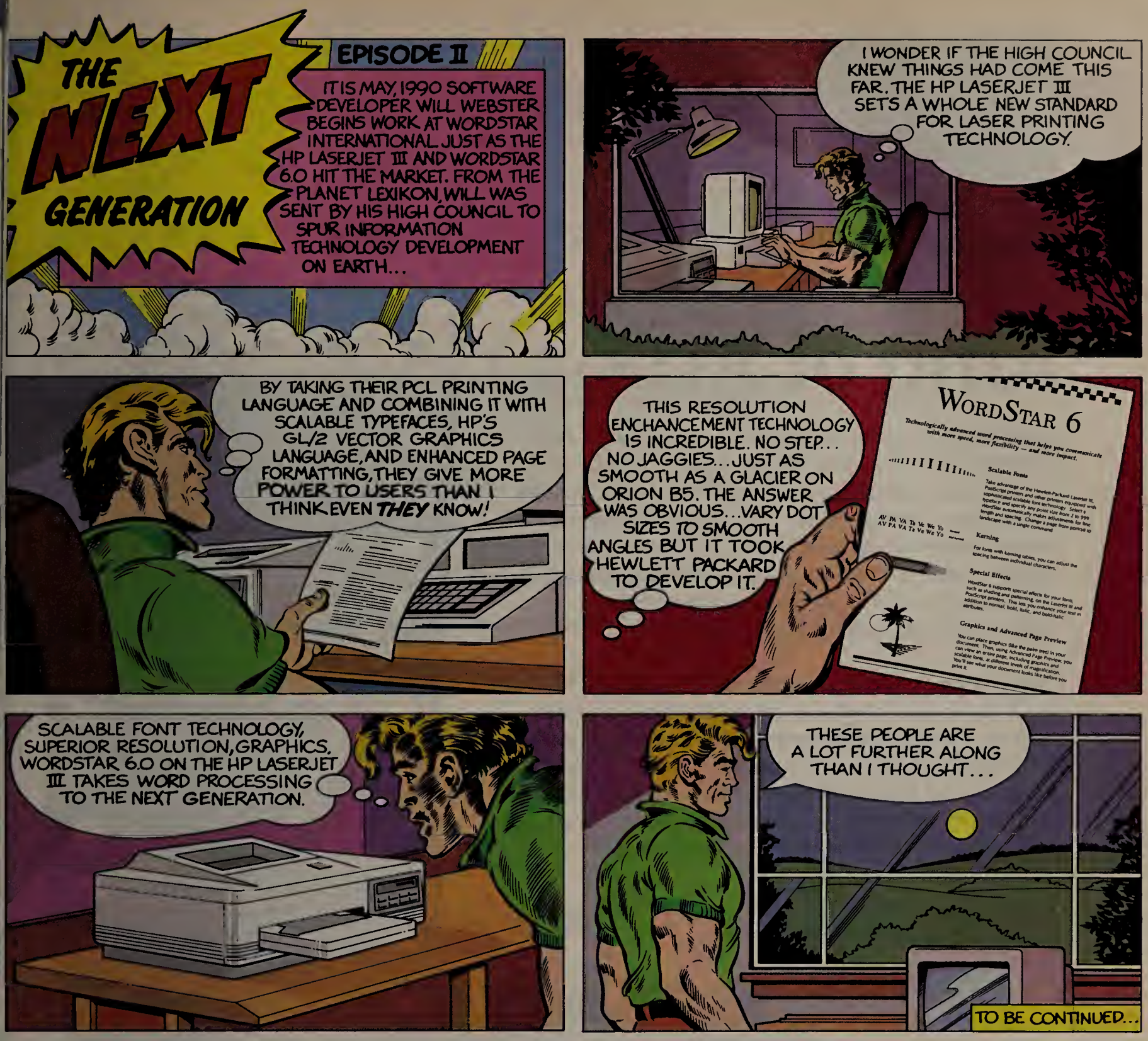
Numonics Corp.
101 Commerce Dr.
Montgomeryville, PA
18936
800/523-6716,
215/362-2766,
215/361-0167 (fax)

Octave Systems Inc.
1715 Dell Ave.
Campbell, CA 95008
408/866-8424,
408/866-4252 (fax)

Penny+Giles Controls Inc.
35 Reynolds St.
Attleboro, MA 02703
508/226-3008,
508/226-5208 (fax)

Presentation Electronics
4320 Anthony Ct. #8
Rocklin, CA 95677
916/652-9281

ProHance Technologies, Inc.
1307 S. Mary Ave.
#104
Sunnyvale, CA 94087
408/746-0950,
408/746-0741



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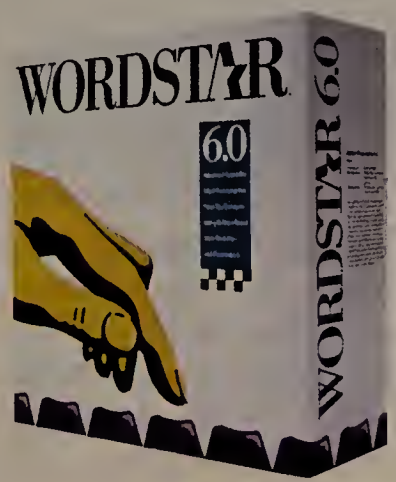

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Paul Mace
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Data Base Publishing, Ventura Style

Turn Ventura Publisher into a data base publisher for invoices, mailing lists, and more. Here's how to transform a data base file into a professional-looking product catalog.

Phyllis L. Neumann

INSIDE HOW TO

177 **Word Processing**
Words Into Print
Price lists are a breeze when you use *WordPerfect*'s parallel columns.

179 **Spreadsheets**
Spreadsheets (A..Z)
How to make your worksheets tell the truth and nothing but the truth.

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Easy-to-follow data entry screens don't happen by accident.

185 **Publishing & Graphics**
The Art of Persuasion
Designing by the rules, and tips for faster formatting in *PageMaker*.

189 **Communications**
The Information Edge
Conferencing via Connect, plus affordable on-line stock quotes.

193 **User Group Tips**
- Protect a crucial DOS file
- Number *Paradox* records
- Fix a tricky *dBASE* merge

Desktop Publishing

Data base management programs are powerful tools for handling large volumes of data, but they're not much good at producing attractive documents. Though some data managers let you add effects like boldface and italics to reports, doing so requires embedding printer control codes—a tricky and time-consuming process.

However, you can combine the information-management power of any data manager with the formatting finesse of *Ventura Publisher* to create catalogs, directories, and mailing lists that have a professionally typeset look. *Ventura* lets you choose from a wide variety of fonts and formats, generate indexes and tables of contents, and even add graphics like company logos.

The key to automating the process is to insert *Ventura* tag names just before the fields in your data base report. You then print the report to disk as an ASCII file and pull it into *Ventura*. Once in *Ventura*, simply define the tags for the first record, and the rest of the records in the file are formatted automatically. Save the chapter, and you have a template you can use over and over—no matter how often your data changes.

This article shows how to turn a data base file into the software product catalog shown in **FIGURE 1**. You'll need copies of your favorite data manager and *Ventura*, plus a laser printer. A working knowledge of how to generate a data base report is also essential. Though the example used here is a product list, you can apply these principles to produce snazzy-looking documents with virtually any kind of data file.

Adding Style to Your Data Files

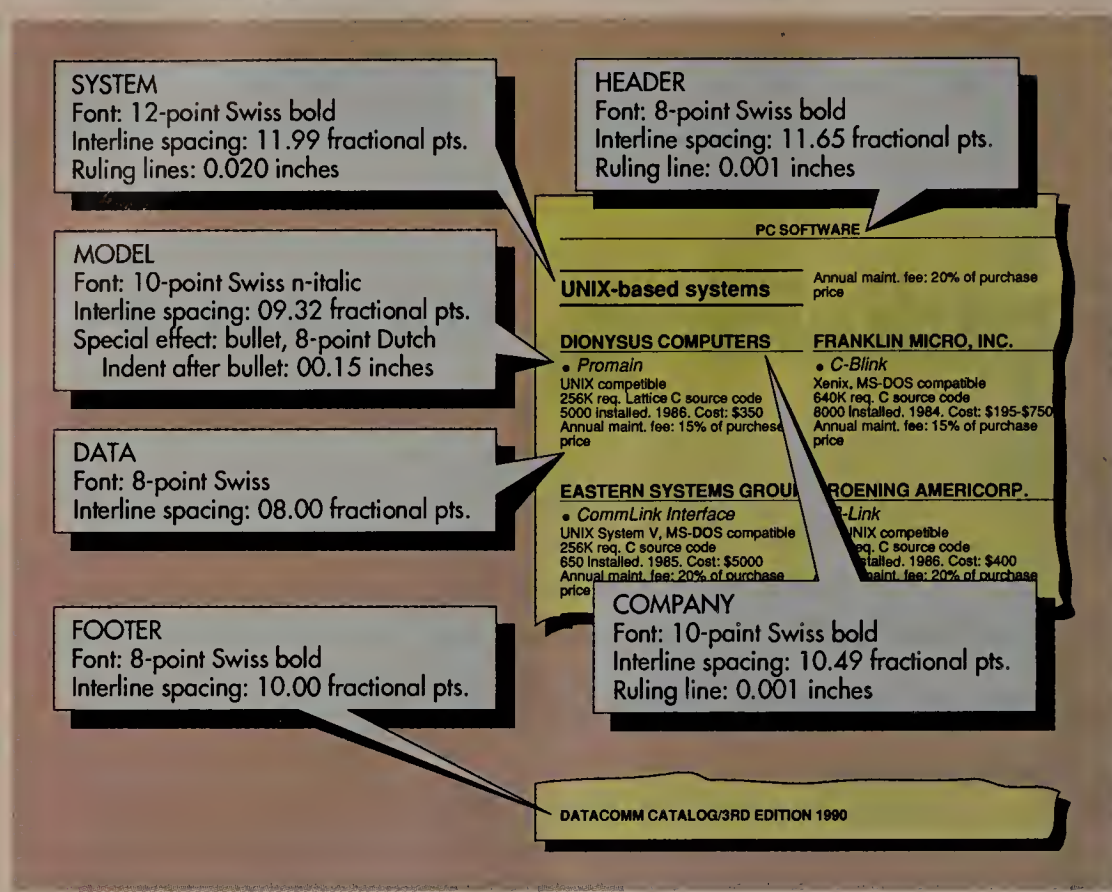

FIGURE 1: You can turn a simple data base report into a polished-looking publication using Ventura's style tags. This sample product catalog was formatted using the tag settings shown above.

Preparing the Data Report

The first step is to prepare a report using your data manager's report writer. You'll have to select and arrange the desired data fields, add linefeeds, and insert tag names. In this example, each record contains the following fields: System, Company, Model, Compatible, Requirements, Language, Installed, Year, Fee, and Maintenance (see **FIGURE 2**).

Place the fields in the order in which you want them to appear in the catalog. Since catalog records are sorted first by System and then by Company, arrange your report so that these fields will print only where needed (for example, if a company makes three products for a particular system, the company's name should appear only above the name of the first product). In this catalog, the System, Company, and Model fields use different formats and so require separate tags. Insert a blank line between each of these first three fields so *Ventura* will recognize them as separate paragraphs.

Since the rest of the fields will share the same format, you can group them together in a single paragraph, using linefeed commands to separate the lines. (This technique is especially useful for creating address lists, where you want to treat each record as a separate paragraph.) To insert linefeeds in your report, type **<R>** at the end of each line. This will instruct *Ventura* to begin a new line without actually beginning a new paragraph.

▶ Add Tag Names to Fields

Ventura stores formatting instructions (fonts, alignment, spacing, and special effects) in *tags*, which are then grouped together to form a style sheet. Each field that requires unique formatting must have its own tag. The tag name must precede the field and contain an @ sign followed by a unique name, a space, an equal sign, and another space. For example, use **@System =** as the tag name for the System field.

To make sure you don't inadvertently insert a space in front of the tag name, set the report's left margin to zero. And to simplify the process, give each tag the same name as the field it's attached to. Place tag names **@System =** , **@Company =** , and **@Model =** in front of the System, Company, and Model fields, respectively. Because the next seven fields in the record share the same attributes, enter a single tag named **@Data =** just before the Compatible field. Later, in *Ventura*, you'll assign specific formatting to each tag.

▶ Print the Report as an ASCII File

The next step is to print the data base report as an ASCII text file. Remove all page breaks from the report. Use the file name extension TXT (for example, CATALOG.TXT) to simplify loading it directly into *Ventura*. Finally, print the report to disk and copy the ASCII file into the *Ventura* directory.

Formatting the Text in Ventura

Once you've coded the report, all you need to do is define the document's layout in *Ventura*, load the report, and define the tags assigned to the fields.

The following sections describe how to set up a four-column product catalog using a variety of fonts, rules, and effects. The first step is to build the underlying page frame for your document.

1. Load *Ventura*, and select its empty style sheet, DEFAULT.STY.

2. Select *Page size & layout* from the *Chapter* menu. Default values should read *Orientation: portrait, Paper type & dimension: letter, Sides: double, Start on: right side.* Click *OK*.

3. Switch to Frame mode, and select *Frame Margins & columns*. Select *4* columns, with margins at **00.30** inches, widths at **01.90** inches, and gutters at **00.10** inches. Select *Copy to facing page* and *OK*.

4. To suppress ruling lines between columns, select *Frame Vertical rules*, and set *Inter-col. rules:* to *Off*. Select *Copy to facing page* and *OK*.

5. Save the style sheet as **CATALOG.STY**.

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All for a very competitive price.

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AMDEK

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▶ Pour Text Into the Frame

Now you'll load the data report directly into the underlying page frame and save it as a new chapter.

1. Click the Text mode icon, place the cursor in the far left corner of the page, and click once.

2. Select *File Load text/picture*, and choose a *Text* file in *ASCII* format. Select *Text cursor* as your destination, then *CATALOG.TXT* from the supplied list. The text automatically flows into the frame.

3. Save the document and style sheet as a new chapter called **CATALOG.CHP**.

▶ Define Style Tags

Now it's time to format your document. Because you inserted tag names in the data base report, importing the file automatically lists the tags in *Ventura*'s sidebar. However, the tags are initially assigned *Ventura*'s default Body Text attributes, so you'll need to assign custom attributes to the System, Company, Model, and Data tags. Here's how to set up the System tag.

1. Select the Paragraph icon, and highlight the System field 'UNIX-based systems' in the first entry.

2. Select *Paragraph Font*, and choose *Swiss 12 Bold Black*.

3. Select *Paragraph Alignment*, set *Horz. alignment:* to *Left* and *Vert. alignment:* to *Top*, and then click *OK*. This will ensure that text lines up along the left margin and the top of each page.

4. Select *Paragraph Spacing*. Set *Above* and *Below* to **0.200** inches, and set *Inter-line spacing* to **11.99** fractional points. To prevent *Ventura* from inserting space at the top of a column, select *Add in above: When not at column top*, and click *OK*.

5. Select *Paragraph Breaks*, and set *Allow within* to *No* and *Keep with next* to *Yes*, then click *OK*. These settings will prevent individual records from being split across columns or pages.

6. Now place rules above and below the System field. Select *Paragraph Ruling line above*, and choose *Width: Column*. At *Height of rule 1:* type **0.020**; at *Space below rule 1:* type **0.030**, then click *OK*.

7. Select *Paragraph Ruling line below*, and choose a column-width rule **0.020** inches high. At *Space above rule 1:* type **0.030**, then click *OK*.

To define tags for the Company, Model, and Data fields, highlight each line in turn and follow the steps outlined above, using the settings shown in **FIGURE 1**.

```
@System = [System]
@Company = [Company]
@Model = [Model]
@Data = [Compatible] compatible<R>
[Requirements]K req. [Language] source code<R>
[Installed] installed. [Year]. Cost: [Fee]<R>
Annual maint. fee: [Maintenance]
```

FIGURE 2: Here's how your data base report template should look. Ventura tag names have been inserted in front of variable fields (enclosed in brackets) for instant formatting inside Ventura.

▶ Create Headers and Footers

Headers and footers can contain useful information like chapter names and page numbers. Here's how to create them for the catalog.

1. Select *Chapter Headers & footers*.

2. Select *Right page header* and *Usage: On*.

3. At the 'Center:' prompt, type **PC SOFTWARE**.

4. Select *Right page footer* and *Usage: On*.

5. At the 'Left:' prompt, type **DATACOMM CATALOG/3rd EDITION 1990**.

6. To insert page numbers, type **[P#]** at the 'Right:' prompt.

7. Select *Copy to facing page*, then click *OK*.

8. To create tags for the header and footer, click on the 'Add New Tag' box in *Ventura*'s sidebar and type in names for both (for example, **Z_header** and **Z_footer**). Then follow the steps outlined above, using the settings shown in **FIGURE 1**.

The Proof Is in the Printing

After you've finished formatting the first catalog item, print out a page of the catalog to make sure it looks the way you want it to. Once you've designed the catalog, you'll no longer have to worry about it—when you need a new edition, just load an updated data base report into *Ventura*. In most cases, no touch-up will be necessary; you'll have a camera-ready, professional-looking document to take to the printer. ■

Phyllis L. Neumann is a computer consultant and editor of Redwood Chips, *the newsletter for the PC Users Group of the Redwoods in Santa Rosa, California.*

POWER TIP NO. 106

Soup Up WordStar Search and Replace

You can speed up *WordStar 4.0* and *5.0* global search and replace tasks that don't require verification. Simply tap any key after you enter the commands and the search strings to freeze the screen display temporarily. You won't see each replacement take place, and the process accelerates dramatically. With *WordStar 5.0* you can use the same trick to hasten spelling checks and global format changes.

Steve Pirog
Upper Darby, Pennsylvania

Words Into Print

Word Processing

Tips for getting the most out of your word processor

This month: Use parallel columns to create a price list with WordPerfect.

George Campbell

Last month's *Words Into Print* showed how to create snaking, newspaperlike columns with *WordPerfect.* This month we examine *WordPerfect*'s parallel columns. The text in snaking columns flows from column to column, but parallel columns run independently, side by side. This format is ideal for price and inventory lists, video scripts with separate columns for audio and video, and layouts that place titles in the margins.

WordPerfect 5.0 and *5.1* offer parallel columns in two forms: with and without block protection. In a block-protected column, page breaks don't split up a row. You would use the nonprotected option if each row held extremely long columns or if you wanted to place titles in the margins of a document. Most of the time you'll use block protection, as described in the following example of how to set up a price list with *WordPerfect 5.1.*

Parallel Universe

With parallel columns it's easier to set the format first and add the text later. Here are the steps:

1. Enter and center your heading (**Amalgamated Traps** in this example), and enter other introductory text.

2. Move to where you want the first column to begin, and press **<Alt>-<F7>CD** to open the Text Column Definition menu.

3. Press **T** to choose a column type.

4. Press **B** to select Parallel with Block Protect.

5. Press **N**, and enter the number of columns (**4** in this case). Press **<Enter>**.

6. Unless you want columns of equal width, ignore the Distance Between Columns option, and press **M** to set margins. When you do, these settings will override the Distance Between Columns default of one-half inch.

7. Type the left and right measurements for each column's margins, pressing **<Enter>** after each dimension. Make sure the columns don't overlap or extend past the overall document margins.

8. When finished, press **<F7>O** to turn on the columns.

Adding the Words

Now enter the price list information. After typing the stock number in the first column, press **<Ctrl>-<Enter>** to jump to the top of the second column. As you type the description, *WordPerfect* will wrap the text in the allotted space. When you type the prices, set decimal tabs to line up decimal points. To do this, press **<Ctrl>-<F6>** before typing

WORDPERFECT SHORTCUT

Easy ASCII Imports

George Beinhorn

When you import an ASCII file into *WordPerfect,* you must replace hard carriage returns with soft returns before you can edit the text. You can avoid this chore by using *WordPerfect*'s hyphenation-zone feature to convert carriage returns to soft returns automatically. The hyphenation zone normally tells *WordPerfect* how far to the left it should look when determining where to break a line. In this case, the zone widens so *WordPerfect* can use it to check each line all the way back to the left margin and see if it's the end of a paragraph.

1. Press **<Shift>-<F8>LZ** to alter the hyphenation zone.

2. Type **25<Enter>25<F7><F7>** to set left and right hyphenation zones to 25 percent each.

3. To retrieve a DOS text file, press **<Ctrl>-<F5>TR.**

4. Type the path and name of the file and press **<Enter>.**

WordPerfect will import the file, keeping hard returns at the ends of single lines but replacing them with soft returns in paragraphs.

George Beinhorn is a freelance writer in Nevada City, California.

each price. When you complete the last column, press <Ctrl>-<Enter> to start a new row. If the columns don't appear on screen, press <Shift>-<F1>DESY<F7>.

When you've finished entering text, press <Ctrl>-<Enter>, and press <Alt>-<F7>CF to disable the column layout and return to the normal format. To repeat the same column layout later, just press <Alt>-<F7>CO.

WORD SHORTCUT

Counting Lines and Words

It's often important to know how many words are in a document, but in *Microsoft Word* you have to print a file to find out. Fortunately, you don't have to send the file to a printer or to disk. This macro, which works in versions 4.0 and 5.0, forces *Word* to print the document to a reserved DOS device called NUL, which simply discards its input. This way you can see the count without generating either a printout or a print file.

1. On a blank *Word* screen, type the following. Don't press the indicated keystroke-command keys—type the actual characters as shown (to create the « and » chevrons, press <Ctrl>-[or <Ctrl>-]):

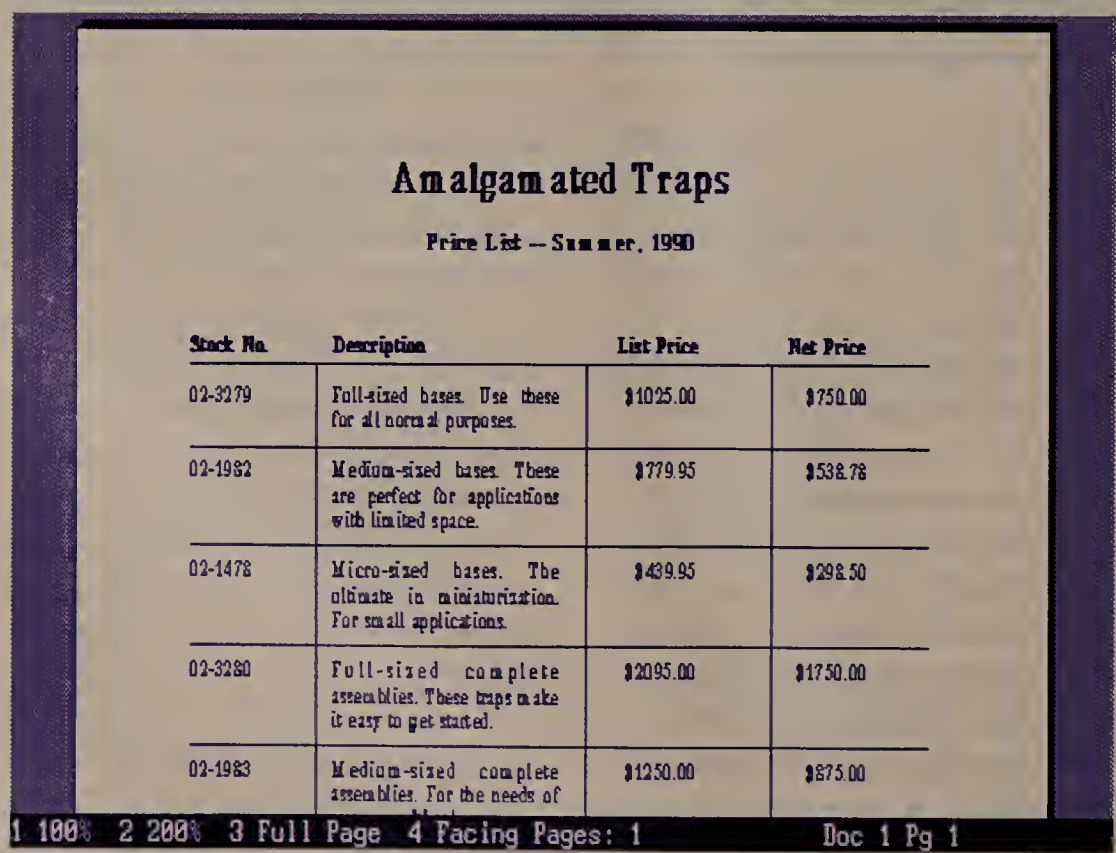
«pause For word and line count, press <Enter> now and at "End of macro" prompt» «Set echo = "off"» <Ctrl Esc> pfnul

2. Press <Shift>-<F10> to select the text.

3. Press <Esc>C and type **wordcount.mac**, but don't press <Enter> just yet.

4. To assign a hot key to the macro, type a caret (^), then press <Ctrl>-C<Enter>.

To run the macro, press <Ctrl>-C and follow the prompts. The line and word counts will appear at the bottom of the screen. —*G. C.*



Amalgamated Traps

Price List – Summer, 1990

Stock No.	Description	List Price	Net Price
02-3279	Full-sized bases. Use these for all normal purposes.	$1025.00	$750.00
02-1982	Medium-sized bases. These are perfect for applications with limited space.	$779.95	$538.78
02-1478	Micro-sized bases. The ultimate in miniaturization. For small applications.	$439.95	$298.50
02-3280	Full-sized complete assemblies. These traps make it easy to get started.	$2095.00	$1750.00
02-1983	Medium-sized complete assemblies. For the needs of	$1250.00	$875.00

1 100% 2 200% 3 Full Page 4 Facing Pages: 1 Doc 1 Pg 1

WordPerfect's parallel column feature keeps rows together in a column format, no matter how many lines each column has.

Editing Parallel Columns

You can edit columnar text as you can any other text. To move between columns, press <Ctrl>-<Home>, then the right or left cursor key.

If you need to change the overall column layout, press <Alt>-<F3> and move the cursor to the [Block Pro:On] code that follows the definition (the code beginning with 'Col Def'). Press <Alt>-<F7>CD and redefine the format using the Column Definition menu described earlier.

Adding Lines

Once you're done making changes, add vertical and horizontal lines to create a grid. Last month's column showed how to add vertical lines, and the procedure is the same for parallel columns. To add horizontal lines:

1. Move the cursor to the blank space between two rows.

2. Press <Alt>-<F9>LH to create a horizontal line.

3. Press V to set the line's vertical position. Press S and <Enter> to center the line between the rows.

4. The remaining defaults will suffice, so skip them and press <F7> to complete the line.

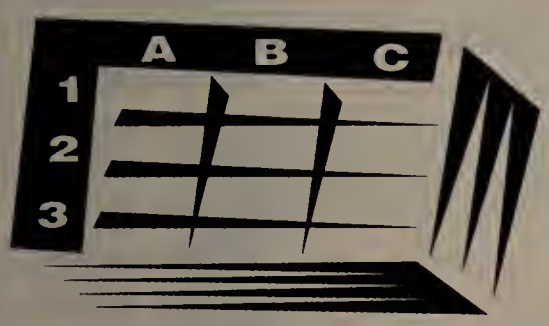
5. To view the line, press <Shift>-<F7>V.

Repeat steps 1 through 4 for each horizontal line. (To save time, record the process as a macro.) Once you've added the vertical lines, you should end up with a price list similar to **SCREEN 1**'s.

George Campbell is a contributing editor for PC World.

Has your word processor got you puzzled? Need tips on using a new feature? Send your questions to Words Into Print, PC World, *501 Second St., San Francisco, CA 94107, or to CompuServe (71571,222).*

Spreadsheets (A..Z)



Spreadsheets

Practical tips for building better worksheets

This month: accuracy, the most important issue of all

Richard Scoville

You use spreadsheets to get answers. But a spreadsheet that gives wrong answers is worse than useless—it's positively dangerous. We've all heard horror stories about bad decisions and even lawsuits resulting from spreadsheet errors. And who among us hasn't endured that humbling feeling when the boss observes that the grand total on your exquisite report is off by a factor of 2?

How can you ensure that your formulas are telling the truth? Start by observing the following hard-won tips:

Point, don't type. There are two ways to build formulas—you can simply type them in, or you can use the cell pointer to highlight the cells and ranges involved. Typing may seem simpler, especially to beginners, but pointing is inherently more accurate. It's easy to type incorrect cell addresses into a complex formula; later it can be all but impossible to find the errors.

Never "erase" with blanks. Every *1-2-3* beginner discovers that you can make a cell appear empty by entering spaces into it. But a space is a label, and formulas that use @COUNT(), @AVG(), @STD(), and so on will factor it in as a zero value. *Excel*'s @ functions ignore blanks, but *Quattro Pro* works just like *1-2-3*. When you need to erase a cell, use */Range Erase* (in *Quattro Pro*, use *Edit Erase block*).

Use dummy data values. Most worksheets begin as pieces of paper covered with figures; then you just go to it, entering labels, formulas, and data. The resulting formulas display actual values, like '$114.98'. But it's hard to tell without a calculator whether such a result is correct.

Next time try building your worksheet with dummy data values. If there's a mistake, you'll spot it at a glance. For instance, a close look at the expense voucher in **FIGURE 1** reveals that the daily totals are incorrect: They omit the mileage expense. When you're sure

SPREADSHEET TOOLBOX

Help From the Analyst

Life offers few experiences more maddening than trying to unearth an error in a web of complex formula references. Symantec's *Cambridge Spreadsheet Analyst*, a $149.95 *1-2-3* accessory, helps turn this formerly impossible task into merely an infuriating one.

To analyze a suspect worksheet, you must exit *1-2-3*, run *Cambridge*, and load the worksheet. *Cambridge* offers both a *1-2-3*–like spreadsheet view and a map display of the entire worksheet that provides a bird's-eye overview of data types and their locations. Hard copy diagnostic reports thoroughly document your spreadsheet, from cell contents to range names and ERRs. Sometimes the voluminous listings of dubious cell references, undefined range names, and so on seem almost too comprehensive.

The program's most useful features are its Xref and Probe commands. These let you trace the references in a formula chain, stepping forward or backward from cell to cell. An excellent macro analysis module provides macro programmers with printed listings and diagrams of macro loop and subroutine structure.

Cambridge can't flatly tell you what's wrong with a formula, but it makes finding errors feasible. It's as close as *1-2-3* users can get to *Excel*'s Info Window display—but it's still no substitute for solid spreadsheet design. Remember, the only good spreadsheet error is the one you never made. —*Richard Scoville*

Cambridge Spreadsheet Analyst
$149.95; Symantec, 10201 Torre Ave., Cupertino, CA 95014; 800/228-4122, 408/253-9607
Reader service no. 615

your formulas are correct, erase the dummy values and put in the real stuff.

Use range names. Once you have marked a range or cell with a range name, you can refer to it by name in formulas and commands. The resulting formulas are much easier to interpret than those containing only references to cell addresses. In *1-2-3* the command is /Range Name Create; in *Excel* it's Formula Define Name. You can include range names in formulas by typing them, or—in *1-2-3* releases 2.2 and 3.0 and *Quattro*—press <F3> to select from a menu of range names.

Be careful when moving cell data. The *1-2-3* command /Move (Edit Move in *Excel* and *Quattro Pro*) can create formula errors by changing the shape of a data range. For example, suppose your spreadsheet includes the formula @SUM(B3..B14), and for some reason you mistakenly put the entry intended for cell C5 into B3. If you try to correct the error by moving the contents of cell B3 back to C5, the formula becomes @SUM(C5..B14), with potentially disastrous, but not necessarily obvious, results. Instead of moving B3's data, copy it to C5 and erase the B3 entry; that way, the formula remains intact.

Build complex formulas piecemeal. Let's say you need to build the following *1-2-3* report range formula, which selectively displays data that's in a worksheet's input range:

@if(@vlookup(bn616,$ ap$541..$ay $562,0)=bn616,@vlookup(bn616,$ap $541..$ ay$562,9),0)

Start by entering **@vlookup(bn 616,ap541..ay562,0)** (this formula searches the leftmost column of a range for the first entry that matches the contents of BN616, and displays that value if found). Check the results of this segment, edit the formula if necessary, and add **=bn616**—then reenter and recheck. Continue until the formula is complete. If you make a mistake, you'll know it was in the last piece you added.

Double-check templates. Use a calculator to verify any application you develop for distribution in your organization. It's one thing to make an error in a onetime analysis; it's quite another to have 50 copies of a template resulting in erroneous expense reports every week!

Finally, never sign your name to a spreadsheet report without verifying the formulas. After all, it's *your* job. ●

Richard Scoville is a contributing editor for PC World.

EXPENSE VOUCHER Mileage @ $0.250

Name: _____
Location: _____
Date: _____

	MON	TUE	WED	THU	FRI	TOTAL
Hotel	1	1	1	1	1	5
Brkfst.	1	1	1	1	1	5
Lunch	1	1	1	1	1	5
Dinner	1	1	1	1	1	5
Airline	1	1	1	1	1	5
Taxi	1	1	1	1	1	5
Misc.	1	1	1	1	1	5
Mileage	10	10	10	10	10	50
TOTAL	7	7	7	7	7	47.5

FIGURE 1: When you build a spreadsheet, test-drive the formula using dummy data values instead of actual ones. Any error you made entering the formulas will pop right out at you. Here, it's clear the daily totals don't add up to the weekly totals.

EXCEL SHORTCUT

Correcting Crossfoot Errors

Ralph Soucie

Crossfoot errors, in which the row and column totals in a spreadsheet refuse to balance, are among the most insidious spreadsheet spoilers. Discovering *whether* your spreadsheet has a crossfoot error is child's play: If you don't get a zero when you subtract the sum of the totals row from the sum of the totals column, you know you're in trouble. Fortunately, *Excel*'s Column Differences and Row Differences options also make it easy to pinpoint *where* the error lies.

Suppose you're putting together a summary of monthly sales by product line for the fiscal year. The product line totals are in the column N, the month-by-month totals in row 9. Sadly, the sum of the values in the range B9:M9 doesn't match the sum of the values in the range N3:N8.

To find out where the error lies, highlight the cells in the totals column (in this case N3:N8). Choose the *Formula Select Special* command, then select *Column Differences. Excel* flags any cells in the column whose formulas differ from those of their counterparts. Obviously, if no cells are flagged, you'll have to try the *Row Differences* option from the same dialog box to weed out the problem cells.

Ralph Soucie is a contributing editor for PC World.

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Data Basics

Data Management

Tips and techniques for managing your data

This month: designing data entry screens

Alan Schwartz

Data base entry screens should be easy to read and understand, speeding data entry while reducing errors. The following tips should help you design effective data entry screens, no matter what data manager you're using. The tips are followed by instructions for designing screens in *dBASE III Plus*.

- If a screen looks crowded, try aligning fields vertically, with the labels to the left. Sparse screens look better with the fields laid out horizontally, labels above.
- A few boxes or lines clarify the data picture by separating the fields into logical groups. In an invoice, for example, you'd probably separate the customer's address from the order.
- It's generally easier to read labels that have the first letter capitalized and the rest lowercase.
- A screen that represents an actual printed form should mirror that form as closely as possible.
- If a pattern of fields is easily recognizable, don't label each field; no one needs to read 'City', State', and 'ZIP'.
- Avoid lengthy messages; they're annoying and can even slow data entry.
- Don't let users change key fields—those that exist solely to identify records, such as invoice and ID numbers. Changing a customer's ID, for instance, would make it impossible to locate his or her previous transactions. In dBASE, use a 'say' command without a 'get' to display a field the user can't change.

Screen Display With dBASE

The screen designer that ships with *dBASE III Plus* is all thumbs—it spawned an entire industry of add-ons (see "Data Base Toolbox"). Creating screens by typing in the code gives you full control but involves a lot of trial and error, as you can't see the screen you're designing. Whether you write the code or let a program do it, you'll have more control if you know how the underlying dBASE code works.

The following code creates **SCREEN 1**:

```
clear
@ 1, 27 say;
"CUSTOMER INFORMATION SCREEN"
@ 1, 72 say date()
set color to w/b,n/bg
@ 2, 0 clear to 18, 79
@ 2, 0 to 18, 79 double
@ 4, 30 say "Customer ID " + CustID
**** Draw line
@ 6, 1 say replicate(chr(196),78)
@ 8, 13 say "Customer name ";
get FirstName
@ 8, 39 get LastName
```

DATA BASE TOOLBOX

Saywhat

There are a zillion dBASE screen design tools, and they're all an improvement over *dBASE III Plus*'s. Yet many are tough to master, and if you lay out screens only occasionally, simplicity is a great virtue.

Saywhat by Software Science is a compact, easy-to-learn screen-drawing program that lets you drag fields, lines, and boxes around the screen with the cursor keys. It lets you manipulate colors and attributes easily and even add light-bar menus. This program is so quick and easy that you can sketch a screen as a user describes what's needed.

For simple screens, *Saywhat* generates a BIN file and the dBASE code needed to run it. A 38K to 50K RAM-resident utility must be loaded to run more complex screens. The utility comes with *Saywhat* and can be freely distributed. *Saywhat* requires DOS 2.0 or later and 192K. —*A. S.*

Saywhat $49.95; Software Science, Inc., 100 Valley Dr., Brisbane, CA 94005; 800/468-9273, 800/231-7849 California, 415/467-6840
Reader service no. 629

```
@ 9, 13 say "Address " get Address
@ 10, 28 get City
@ 10, 48 say "," get State picture "@!"
@ 10, 52 say "." get ZIP;
picture "@r 99999-9999"
@ 12, 13 say "Phone " get Phone;
picture "@r (999)-999-9999"
**** Draw line
@ 14, 1 say replicate(chr(196),78)
@ 16, 20 say "Credit card number ";
get CCard
read
```

In a dBASE program, a data entry screen is described by a series of @ say /get statements, followed by a read command that pauses the program until the data has been entered. The say clause describes the text to appear on screen. The get clause lists the field or variable in which data will be entered.

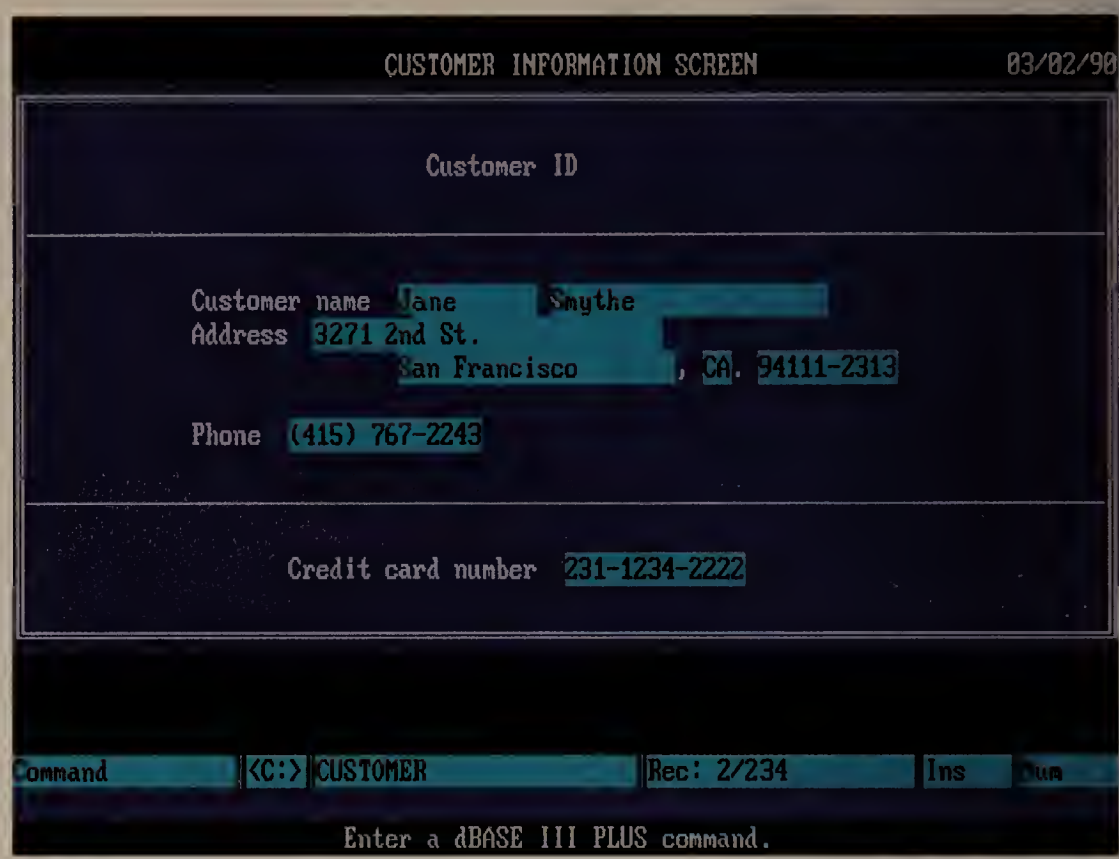
The first number following @ in an @ say/get command is the row in which the message should appear, and the second number is the column. These numbers begin at 0,0 in the top left corner.

The picture clause controls how data entry fields look and what characters can be typed into them. The 9's in 'picture "@r (999)-999-9999"' ensure that only numbers are entered, while the parentheses and hyphens make the entry more readable. Picture's @r function strips out this punctuation as data is saved. This is only one example of what you can do with the picture clause.

Regardless of how the screen appears, the cursor moves from one field to the next in the order of the get statements. You can change colors with 'set color to' commands.

No matter how well designed the screen, people will make data entry errors. Just about every other dBASE language product has an error-catching *valid* clause in the @ say/get command. We'll discuss validating techniques in an upcoming column.

Alan Schwartz is a partner in Micromega Systems in San Francisco, specializing in custom data base application development.



SCREEN 1: The screen created with the code discussed in the article.

PARADOX SHORTCUT

Restoring a Form or Report

Celeste Robinson

If you damage a form or report, you'll probably want to restore it without losing the current version of the table file. Unfortunately, *Paradox* keeps track of when forms and reports are created and changed; an F*n* or R*n* file restored through DOS or a backup program may look out-of-date or corrupted to *Paradox,* rendering it unusable.

The trick is to change the name of the table and all associated files before restoring your backups to the original name. Then use *Paradox*'s own tools to copy the support file back to the original:

1. Inside *Paradox,* use *Tools Rename Table* to change the current name of your table, *tablename,* to **temp** or something similar.

2. Exit *Paradox,* and use DOS or your backup program to restore *tablename.**.

3. Reenter *Paradox,* and use either the Tools Copy Form or the Tools Copy Report command to copy your form or report from *tablename* to TEMP.

4. Use *Tools Rename Table* to give your table its original name. When you're prompted to cancel or replace the existing table with that name, select *Replace.*

Your table will now accept the restored form or report as the correct one.

Celeste Robinson is the author of The Best Book of Paradox *(Howard W. Sams and Company, Carmel, Indiana, 1990).*

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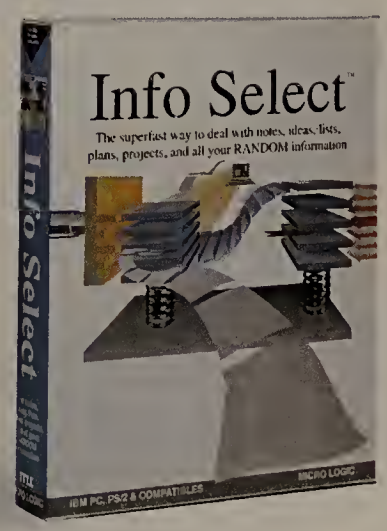

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The Art of Persuasion

Publishing & Graphics

Expert advice for creating high-impact documents and presentations

This month: the do's and don'ts of rules, and tips on precoding documents for speedy formatting in PageMaker

Richard Jantz

Today's desktop publishing and presentation graphics programs make it easy to add basic graphic enhancements, such as lines and boxes, to your work. Among the most common of these are ruling lines, or *rules.* Rules are used to separate elements on a page (such as multiple columns) or to guide the reader's eye to items like headlines and graphics. Used properly, rules can make your documents more accessible and enticing. Used haphazardly, however, they can distract from your message rather than enhance it.

Considering the variety of rules available, it's no wonder they're often misused. You can create horizontal, vertical, or even diagonal rules in a wide range of sizes, colors, and patterns. The kinds of rules you choose depend largely on the type of document you want to create.

Rules can be decorative as well as functional, but they should be used logically and consistently throughout an entire document. That means you must decide which rules to use and where to put them at the outset, when you're designing the document. Here are some guidelines to get you started:

- Limit the types of rules used in each document. While rules can give uniformity and order to virtually any text-heavy document, having too many can be distracting.
- Use rules that are consistent with your document's identity or message. Generally, plain rules are more suitable for formal presentations like corporate reports, while fancier rules are fine for more casual documents—newsletters, fliers, invitations, or any other materials that must compete for the reader's attention.
- Use rules consistently for specific purposes. For example, use horizontal rules of one weight (thickness) for head-

NUTS & BOLTS: PAGEMAKER

Fast Formatting

PageMaker 3.0's style sheet tags make it easy to format text, but tagging large documents can be a pain. You can save time by precoding the text in your word processor. Simply enter the tag name in angle brackets (such as <Subhead>) immediately before the text, then define the tag's attributes inside *PageMaker.* Here's an example of how to do it:

1. With your word processor, create a document called **TAG.TXT** that contains the line **<Subhead> This paragraph is tagged Subhead.** Make sure no spaces appear between the tag name and the text. Save TAG.TXT as an unformatted file.

2. Start *PageMaker* and open a new document. Select *Options Style palette* to list the current tags. Click *Body text* to assign it this default tag.

3. Select *File Place* and pick *TAG.TXT* from the dialog box. Click *Read tags* and *OK.*

4. Click again, and *PageMaker* places the text on the page and adds the Subhead tag in the Styles window.

5. To define the new tag, select *Type Define styles*. Select the tag in the dialog box, then select *Edit* and specify type, paragraph, tabs, and other settings. Click *OK* twice, and *PageMaker* will automatically format the text in the styles you've defined.

That's all there is to it. You can also insert *PageMaker* tag names in print files created with spreadsheet and data base applications. Best of all, you can use *PageMaker*'s Export command (File menu) to save the text and tags for further use in your word processor. —*R. J.*

lines, another weight for subheads, and a third for separating charts or graphics.

• Use vertical rules to separate columns in newsletters and other multi-column documents, especially if the type isn't *justified* (aligned on both sides) or if the space between columns is less than 1 pica wide.

DESKTOP PUBLISHING TOOLBOX

VP Manager

Managing *Ventura* documents can be just as daunting to veterans as it is to newcomers, especially when different users work on the same files. But with a nifty utility called *VP Manager* (formerly *Desktop Manager),* tracking documents and their component files is virtually painless. From an icon-rich *GEM* interface, you can record job-tracking information and manipulate (move, copy, rename, and delete) chapter and publication-files. You can also generate reports on staff assignments, production and scheduling data, and document revisions, and create file and tag lists. *VP Manager* even has an automatic backup option that saves the current chapter at timed intervals—a dream feature that will prevent migraines in the event of a program crash or power failure. —*R. J.*

VP Manager $149; Aristocad, Inc., 1650 Centre Pointe Dr., Milpitas, CA 95035; 408/946-2747

Reader service no. 627

• Use horizontal rules to separate headings from text, text from graphics, and one text item from another within the same column.

• Use horizontal rules to set off headings, subheads, and pull quotes. This is a good way to enhance the appearance of text when you have a limited number of fonts. Avoid using thick or fancy rules that dominate the type, and allow plenty of white space around the heading and rules.

To liven up your documents, create custom rules using periods, angle brackets, or decorative characters such as stars or check marks.

• Use rules to separate items inside tables. If the table should be read from left to right, use horizontal rules to separate rows; if it should be read top to bottom, put vertical rules between columns. Use both types only in complicated mathematical or scientific tables.

• To liven up your documents, create custom rules using periods, angle brackets, or dingbats (decorative characters such as stars, check marks, and other shapes).

• Print out a master sheet detailing the different rules you've chosen for each document, along with examples of how they should be used. Give a copy to everyone who works on your documents.

• Last but not least, feel free to innovate when your document demands it. Sometimes, even the best rules about rules are meant to be broken. ●

PC World *contributing editor Richard Jantz is the author of* Ventura Publisher: Beyond the Basics *(John Wiley & Sons, New York, 1990).*

The Rules About Rules

BLIMPTimes

June 1990 Volume 10 Number 3

Making News This Month

President Honors Blimps

Blimp Airshow on Cable TV

Biggest Blimp Hanger Ever

In This Issue:

National Blimp Conference 3

Remembering the Hindenburg 4

The Impact of Computerized Flying 5

The BLIMP Times Profile. Low-Flying Jimmy Brulet 6

Long Island pilot offers blimp weddings over New York City

Bruce Anderson Wins Wittreich Cup

Stunt pilot Jimmy Brulet demonstrates his daredevil low-flying tricks by the rugged California coastline. His story begins on page 6.

BLIMP Times 1

BLIMPTIMES

JUNE 1990 Volume 10 Number 3

Making News This Month

Bruce Anderson Wins Wittreich Cup

In This Issue

A Good Year for Blimps

In the newsletter on the left, the lack of rules makes it difficult to distinguish between items on the page. The redesigned newsletter (right) uses rules as an integral part of the document's new look. In addition to changing the fonts and the masthead, the designer added rules to organize text items and emphasize important elements like headlines. The photo was moved and resized, with a box added as a border. Finally, a decorative box was drawn around the page, giving the document a more newspaperlike appearance.

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The Information Edge

Communications

On-line resources for business and professional users

This month: Set up private conferences on Connect, and dial up cheap stock quotes with TeleChart 2000.

Judy Getts

Ever find yourself in a city like London or Copenhagen with only a few hours for sightseeing? What do you explore—the art galleries or the architecture? The royal palace or the market?

As the list of on-line services expands, the business communications user confronts a similar dilemma: On-line options are many, but time is limited. To help you sift the wheat from the chaff and get the most out of your on-line time, *The Information Edge* will scout out the best deals available. In the coming months, you'll find profiles of dial-up data bases, electronic-mail systems, and consumer services.

Additionally, each month in an item called *The Professional Edge*, a guest expert will examine an on-line service geared toward professionals in law, medicine, or finance. This month, we inspect Worden Brothers' low-cost dial-up stock quote service and charting software, *TeleChart 2000*. But first we'll look at the Connect E-mail and conferencing service. Designed for *Windows* users, it's unlike any other service you've seen.

Point, Click, Connect

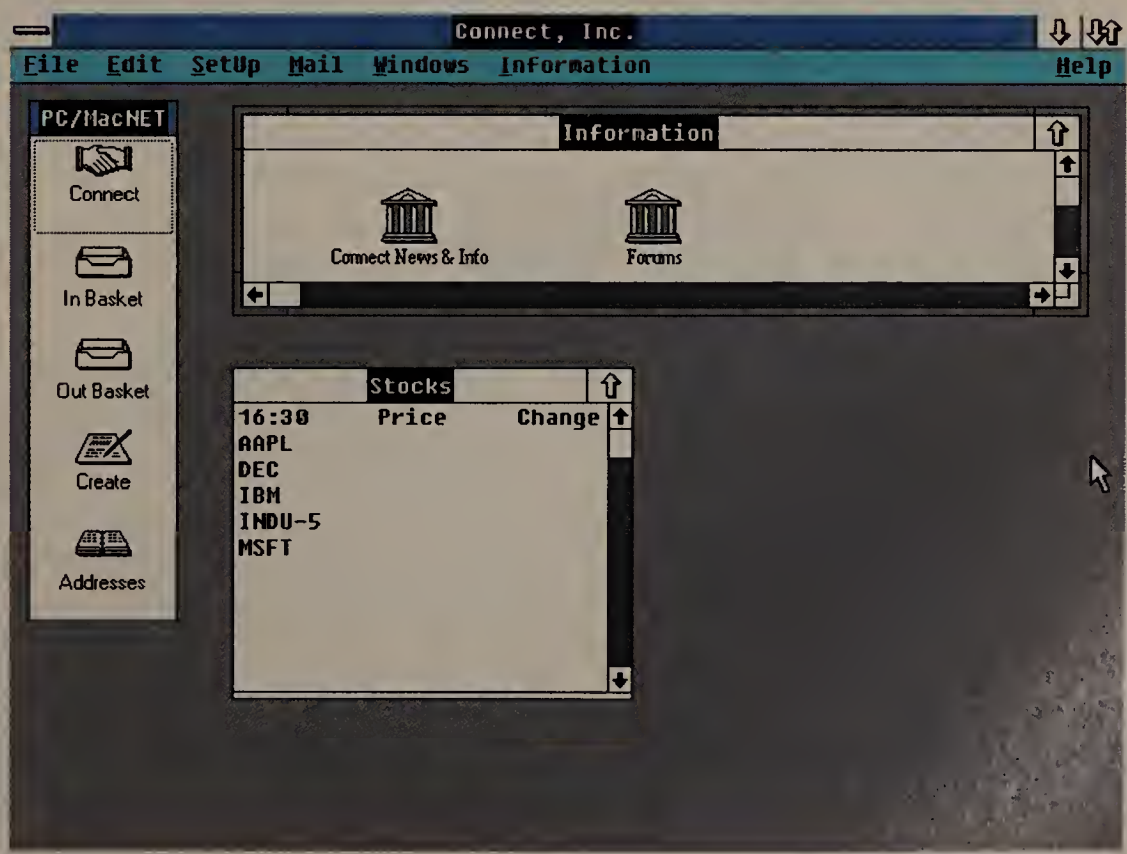
Even in this age of graphical interfaces, most on-line services hark back to the bare DOS prompt. Fortunately, Connect offers a friendlier, *Windows*-driven interface that, together with the service's low-cost private conferences, lets you tie your organization together with a minimum of technical anguish.

On line since January 1988, Connect serves 16,000 subscribers, 80 percent of them Macintosh users. But PC use is growing. Connect offers E-mail, conferencing, and stock quotes, although it's not intended to compete with a CompuServe or a GEnie. The public conferences are narrowly focused, and the downloadable software pickings are slim. There's only one PC-specific forum, and many forums cost extra.

Connect succeeds at its main charter—renting private conferencing systems. Setting up a forum is easier than maintaining a BBS: You simply tell Connect the topics you want included and send the files to post. Private forums are also cheap—you pay a $2000 flat fee, compared with at least $500 a month on CompuServe.

Who can use this service? Just about any organization that wants an easy-to-use forum for keeping in touch with far-flung offices, salespeople, members, or customers. It's also a good E-mail system for companies with a mix of PCs and Macs.

To link up, you use a $99.95 package called *Connect Business Information Network* (previously *PC/MacNet*). *CBIN* runs under *Windows* and includes *Windows* run-time. Click on



Connect offers an icon-based Windows interface for navigating on line. Services include E-mail and stock quotes, but Connect's main charter is to rent low-cost, private forums to companies.

Connect, and *CBIN* dials and logs you on. Connect's simple interface consists of a few icons that provide help, escort you into forums, and manage E-mail.

Connect's superb E-mail system reaches far and wide. You can route mail to MCI Mail, EasyLink, and any system on the DASnet translation hub. *CBIN* lets you append binary files, add text from *Windows'* Clipboard, and select mail addresses easily. *CBIN* logs on to Connect at specified times, uploads and downloads mail in the background, and even collects stock quotes from Connect's Standard & Poor's Ticker III. And there's no script language to mess with—you customize sessions by clicking on buttons.

Connect's easy-to-use forum interface is the same for public and private forums. Each forum offers customized icons that lead you to downloadable messages and software.

Unfortunately, the interface resembles a simple bulletin board more than a conferencing system. To send E-mail to one or more people (instead of the entire group), you must exit the forum to the E-mail module. Unlike with most services, there's no *message threading*, the ability to reply to individual messages and trace a running conversation back to its source. You can search a forum by keyword or table of contents, but finding a file is often tedious. Also, several times line noise caused Connect to send garbled screen displays.

Logging on isn't cheap either. During business hours, Connect costs $10 an hour plus 3 cents per 1000 characters, and $5 an hour plus 2 cents per 1000 characters after 7 p.m. You're charged for all characters sent and received, including screen messages and files. During prime time, sending a one-line message costs about 20 cents, and perusing forums costs about $14 an hour ($10 plus a $4 surcharge). CompuServe's fees are comparable ($12.60 an hour), but with Connect's character surcharges, costs rise if you swap a lot of E-mail.

Connect can't compete with dial-up consumer services, and though it offers painless E-mail, mail costs are steep. Even with conferencing, Connect lacks the tools for sophisticated group discourse. Still, Connect has its place. If your group needs a friendly, on-line broadcast medium, or if your PCs and Macs need a common E-mail system, Connect's slick, easy-to-learn interface makes sense.

Judy Getts is a contributing editor for PC World.

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THE PROFESSIONAL EDGE

Stock Quotes for Less

David Runkle

Casual investors who blanch at the high cost of downloading stock quotes can take heart. Worden Brothers' *TeleChart 2000* stock charting software opens a window to inexpensive historical quotes.

At the touch of a key, *TeleChart 2000* dials Worden Brothers' stock data base, downloads prices, and maps them into colorful bar charts. The data base includes two years of prices for 800 major New York Stock Exchange, American Stock Exchange, and over-the-counter issues, with prices current to the end of the previous trading day. It's not as extensive as Track Data's Dial/Data service, but downloading costs are cheaper by half—data base access is toll free, the software costs only $49, and quotes are only 1¼ cents per quote for the first 50 quotes daily, and ½ cent per quote for additional quotes.

The smooth menu interface is based on function keys. Pressing <F1> displays a graph of Dow Jones activity for the past year. You can also edit quote errors, delete charts, and change stock names or symbols.

The analytical tool set isn't as rich as in Equis International's *Metastock Professional*, but it's sufficient for most needs. *TeleChart* maps moving averages, trend lines, and prices and offers technical indicators ranging from stochastics to the relative strength index. You can also call on a time-segmented volume indicator that tracks buying and selling pressures. The program lets you print graphs and export quotes in ASCII format. Transfers are error checked, and at 1200 bps, downloading takes less than a minute per 100 stocks.

TeleChart isn't quite perfect: Once a session was severed by line noise, and the program bumped me to DOS. In addition, transfer speed tops out at 2400 bps. But despite a few flaws, *TeleChart 2000* is a sharp deal.

David Runkle is a professional investor in Salem, Oregon.

TeleChart 2000, Worden Brothers, 111 Cloister Ct. #104, Chapel Hill, NC 27514; 919/490-5250
Reader service no. 626

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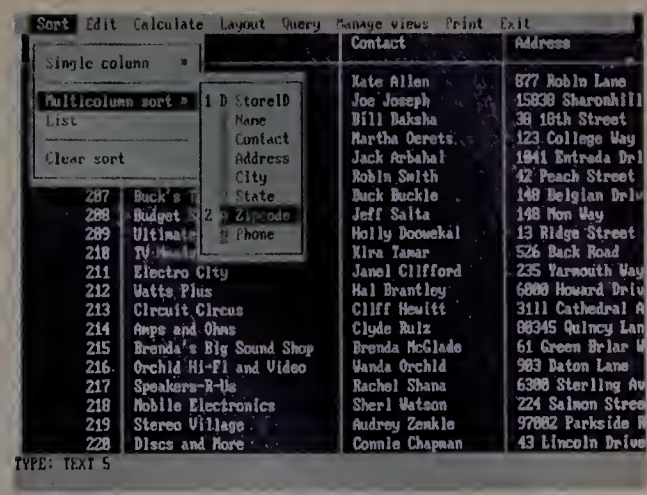

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User Group Tips

Helpful hints from members of the nation's user groups

Getting Protection

Two of the files that are central to DOS, IBMBIO.COM and IBMDOS.COM, are hidden, so they're protected from being copied, erased, changed, renamed, overwritten, or listed by a DIR command. A third file, however, has no special attributes and isn't protected: If COMMAND.COM is erased or corrupted, your system will refuse to boot.

You can protect COMMAND.COM by turning on its read-only attribute, using the ATTRIB program that comes with DOS 3.0 and later versions. To make COMMAND.COM read only, make sure you're in the root directory of the boot drive and that ATTRIB.EXE is in a directory on the path, then type **attrib +r command.com**. To turn off the read-only attribute, type **attrib –r command.com**.

Also unprotected, in most circumstances, are the system's CONFIG.SYS and AUTOEXEC.BAT files, which the installation routines of a great many programs modify. These too can be made read only.

Many installation programs, rather than rewriting your AUTOEXEC.BAT and CONFIG.SYS files directly, will rename them, copy them into files that have the originals' names, and then make modifications to these new files. Making the originals read only is no protection against this trick. Having your original files changed in this manner isn't as drastic, of course. You still have the unchanged files, albeit with names that DOS won't look for when booting.

If you're a veteran user who prefers to change AUTOEXEC.BAT and CONFIG.SYS manually, you can give those files the ultimate protection by hiding them, just as IBMBIO.COM and IBMDOS.COM are hidden. Although ATTRIB can't change the hidden attribute, several utility packages, including Peter Norton's *Norton Utilities* and *Norton Commander*, Central Point's *PC Tools Deluxe*, and Xtree's *XtreePro Gold*, can.

Lyn Bettencourt
Modesto PC User Group

Counting Your Paradox Records

In a *Paradox* table, it's occasionally handy to have record numbers listed in their own field. If you realize belatedly that a table needs a record-number field, use the Modify Restructure menu option to add a numeric field named **Record No**. Once you restructure your table, use Scripts Editor Write to create this short program:

```
reset
edit "tablename"
scan
   [Record No] = recno()
endscan
do_it!
```

Running this script will fill the Record No field with the record numbers throughout the table.

Brian J. Smith
LAPALS
Southern California Paradox Users Group

Fixing Those dBASE-to-WordPerfect Merges

In "WordPerfect Merges With dBASE III Plus" [*User Group Tips*, September 1989], Milt Hull offers a dBASE program that outputs data to a *WordPerfect 5.0* merge file. Mr. Hull's method works fine, as long as there are no special characters (*ç*, *é*, *à*, and so on) in the merge. Although both *dBASE* and *WordPerfect* support these characters, they disappear when *WordPerfect* reads a secondary merge file it didn't create itself.

The solution is extremely simple. After you've created the merge file in *dBASE*, and before you begin the actual merge, retrieve the file in *WordPerfect* and convert it to ASCII format by typing **<Ctrl>-<F5>12** *filename* **<Enter>**. Then save the file as you normally would. *WordPerfect* will now see the file as one that it created, and the special characters will be in their correct places.

Luk Van Loock
Hobby Computer Club
Schoten, Belgium

Chip in! If you're a member of a user group and have tips to share, send them to PC World. *We pay $25 for each published tip. Or if you have a business problem that requires a PC solution, get in touch with our experts. See How to Contact PC World, page 4.*

POWER TIP NO. 107

Norton Integrator Command Stack

Norton Utilities' Integrator program (NI.EXE), which offers on-screen documentation and an interface for the other utilities, has its own command stack. Pressing **<Ctrl>-E** will back you up, one command at a time, through the utilities you've run since you last loaded the Integrator. **<Ctrl>-X** will move you forward.

George Beinhorn
Nevada City, California

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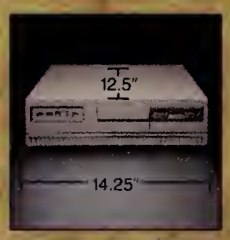

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Automatically log time spent in directories, clear the screen and banish the cursor, store the date and time in environment variables, sort text files safely, run a batch file to delete files and directories, and see why C++ takes center ring.

Edited by Tom Swan

```
10 'LOGGING.BAS by Gil Gagnon
20  FILE$="c:\log\last.dir" : MINIMUM=0      'minimum minutes logged
100 'get current directory information
110 EDIR$=ENVIRON$("ED") : ETIME$=TIME$ : EHRS=VAL(MID$(ETIME$,1,2))
120 EMIN=VAL(MID$(ETIME$,4,2)) : ESEC=VAL(MID$(ETIME$,7,2))
200 'create or read last dir info
210 OPEN FILE$ FOR APPEND AS #1 : CLOSE #1 : OPEN FILE$ FOR INPUT AS #1
220 IF EOF(1) THEN 700
230 INPUT #1, STIME$, SDIR$ : HRS=VAL(MID$(STIME$,1,2))
240 MIN=VAL(MID$(STIME$,4,2)) : SEC=VAL(MID$(STIME$,7,2))
300 HRS=EHRS-HRS : MIN=EMIN-MIN : SEC=ESEC-SEC 'calculate elapsed time
310 IF SEC<0 THEN SEC=SEC+60 : MIN=MIN-1
320 IF SEC>30 THEN MIN=MIN+1
330 IF MIN<0 THEN MIN=MIN+60: HRS=HRS-1
340 IF HRS<0 THEN HRS=HRS+24
400 IF HRS=0 AND MIN<MINIMUM THEN 700 'if elapsed < minimum, don't output
410 'if previous directory = root don't output
420 IF SDIR$="\" OR SDIR$="" THEN 700 'if previous dir = root, don't output
430 IF EDIR$=SDIR$ THEN 800           'if same directory, don't output
500 'output to ALLDIR.LOG
510 LOGFILE$="c:\log\alldir.log" : OPEN LOGFILE$ FOR APPEND AS #3
520 PRINT #3, DATE$, STIME$, ETIME$, "Elapsed:"STR$(HRS)":"STR$(MIN), SDIR$
600 PRINT "Elapsed time in: "; SDIR$  'display time spent in directory
610 PRINT HRS; "hours"; MIN; "minutes."
700 CLOSE : KILL FILE$ : OPEN FILE$ FOR OUTPUT AS #2
710 WRITE #2, ETIME$, EDIR$           'save current time and directory
800 SYSTEM
```

LISTING 1: When used with XCD.BAT, LOGGING.BAS logs time spent in directories.

Pro Logs

Accountants, lawyers, and other professionals need to track how much time they spend working for dozens of clients. With a BASIC program and a short batch file, your PC can log this information automatically. Here's how:

First, create a directory called C:\LOG for storing log information. Also create separate directories for each client: for example, C:\SMITH and C:\JONES.

Type in the BASIC program LOGGING.BAS [see **LISTING 1**] and the batch file XCD.BAT [see **LISTING 2**]. Store LOGGING.BAS in C:\LOG and XCD.BAT in a directory listed in a PATH command.

From then on, use **xcd** instead of 'cd' to change the current directory and start a client's meter running. To begin working for Smith, enter **xcd c:\smith**. When doing something for Jones, type **xcd c:\jones**. These commands insert the current time along with the specified path name into a file called C:\LOG\LAST.DIR. Then, when you next use XCD to switch to a different directory, LOGGING.BAS reads LAST.DIR, calculates the elapsed time, and logs the result in C:\LOG\ALLDIR.LOG. Examine or print that file to see current log entries.

Gil Gagnon
Mississauga, Ontario, Canada

```
echo off
if "%1"=="" goto noPathErr
cd %1
set ed=%1
c:\dos\basic c:\log\logging.bas
set ed=
goto end
:noPathErr
echo Error: No directory named
echo Syntax: xcd [d:]\pathname
:end
```

LISTING 2: XCD.BAT switches directories and calls LOGGING.BAS to keep a time log.

Editor's note: Modify the path name in the fifth line of XCD.BAT if BASIC is not in your C:\DOS directory. Depending on your flavor of BASIC, you might have to change 'basic' to **basica** *or*

(continues)

```
echo off
echo.
echo Currently logged into:
type d:\log\last.dir
echo.
echo To display log entries,
pause
more < c:\log\alldir.log
```

LISTING 3: LOG.BAT displays log information created by LOGGING.BAS.

gwbasic. *To adjust the minimum number of minutes to log for a client, change LOGGING.BAS's line 80; for instance, if you bill clients in 10-minute increments, change '0' to* **10**.

Always type XCD directory names in full. Never use the current (.) and parent (..) shorthand notations—if you do, the log entries will show these symbols, not client names.

After using XCD, you can run LOG.BAT (see **LISTING 3***) at any time to display the client directory you're currently logged in to and to list all log entries. To print a copy of that information, enter* **type c:\log\alldir.log >prn**. *To start a new set of logs, delete C:\LOG\ALLDIR.LOG.*

Whenever you've finished working on one client's account and aren't ready to immediately begin work on another (especially before shutting off your system), issue the command **xcd ** *to return to the root directory. This logs the final entry for the day and ensures that you don't leave a client's meter running overnight.*

Drawing a Complete Blank

I liked Paul Katzer's suggestion for blanking the screen by executing CLS, then redirecting a PAUSE command to NUL ["Screen Blanking Without TSRs," *User Group Tips*, February 1990]. But even this clever technique doesn't remove the blinking cursor. I wrote a program called BLANK.COM to completely blank out the screen. You can call it from a batch file or run it directly from the DOS command line. After running the program, press any key to restore the DOS prompt.

James Eckhardt
Addison, Texas

Editor's note: I modified Mr. Eckhardt's program, which gave the cursor a "negative" size—a common method for erasing the cursor, but one that doesn't work on all PCs. Instead, BLANK.COM now banishes the incessant flasher by sending it to a nonexistent location (0,25).

To create BLANK.COM, type the lines in **LISTING 4** *into a file called BLANK.DAT. Be sure to include the blank line between 'int 20' and 'rcx'. Make sure that the DOS command DEBUG is in a directory on your path. Then, at the DOS prompt, type* **debug < blank.dat**. *Copy the newly created BLANK.COM to a directory on your path, then enter* **blank** *to blank the screen—cursor and all.*

```
a100
mov ax,0700
mov bh,0
xor cx,cx
mov dx,184f
int 10
mov ah,2
mov bh,0
mov dx,1900
int 10
mov ah,7
int 21
int 20

rcx
1b
nblank.com
w
q
```

LISTING 4: BLANK.DAT, when fed to DEBUG, creates BLANK.COM, a screen-blanking program.

Environmental Date and Time

I needed an easy way to add the date and time to a DOS 3.3 batch file. To do that, I developed DATETIME.BAT [see **LISTING 5**], which assigns the date and time to the variables *%cdt%* (current date) and *%ctm%* (current time).

When DATETIME.BAT runs, it uses the > and >> operators to create a new batch file, SETDT.BAT, and add lines to it: First is an @ECHO OFF command. The second and third lines have SET commands that assign arguments %3 and %4 to environment variables.

Next, DIR lists SETCURDT.BAT's directory entry, from which FIND filters other text such as the path name and bytes-free value. The result: a single-line batch file called ROUTER.BAT reading something like 'SETDTBAT 39 2-15-90 9:42a'. Calling this batch file executes SETDT with four arguments: BAT, 39, 2-15-90, and 9:42a, the first two of which are ignored. The last two are saved to the variables *%cdt%* and *%ctm%*. After these steps, DATETIME.BAT erases ROUTER.BAT and SETDT.BAT, leaving the date and time in the environment.

Cecil M. Goeldner
Maumelle, Arkansas

Editor's note: To use this technique, you must be running a version of DOS that implements the CALL command (DOS 3.3 or later). Copy DATETIME.BAT to a directory listed in a PATH command and call it from another batch file. (FIND.EXE must also be in a directory in the current path.) TEST.BAT (see **LISTING 6***) shows how you can use DATETIME.BAT and its resulting variables. The last two lines remove the variables from the environ-*

```
@echo off
echo @echo off    > setdt.bat
echo set cdt=%%3 >> setdt.bat
echo set ctm=%%4 >> setdt.bat
dir setdt|find "BAT">router.bat
call router
del router.bat
del setdt.bat
```

LISTING 5: DATETIME.BAT stores the date and time in environment variables.

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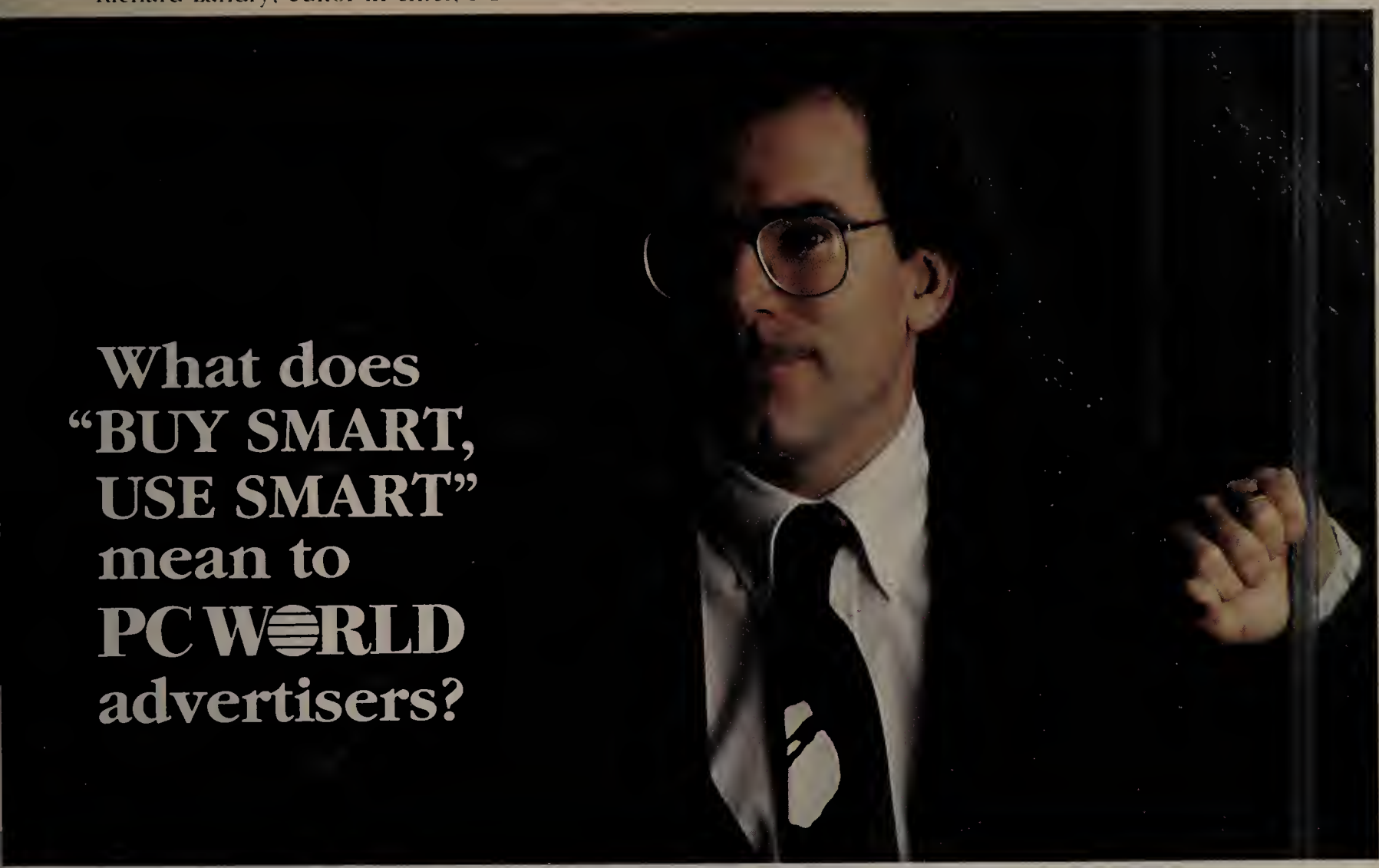
Richard Landry, editor-in-chief, *PC World*



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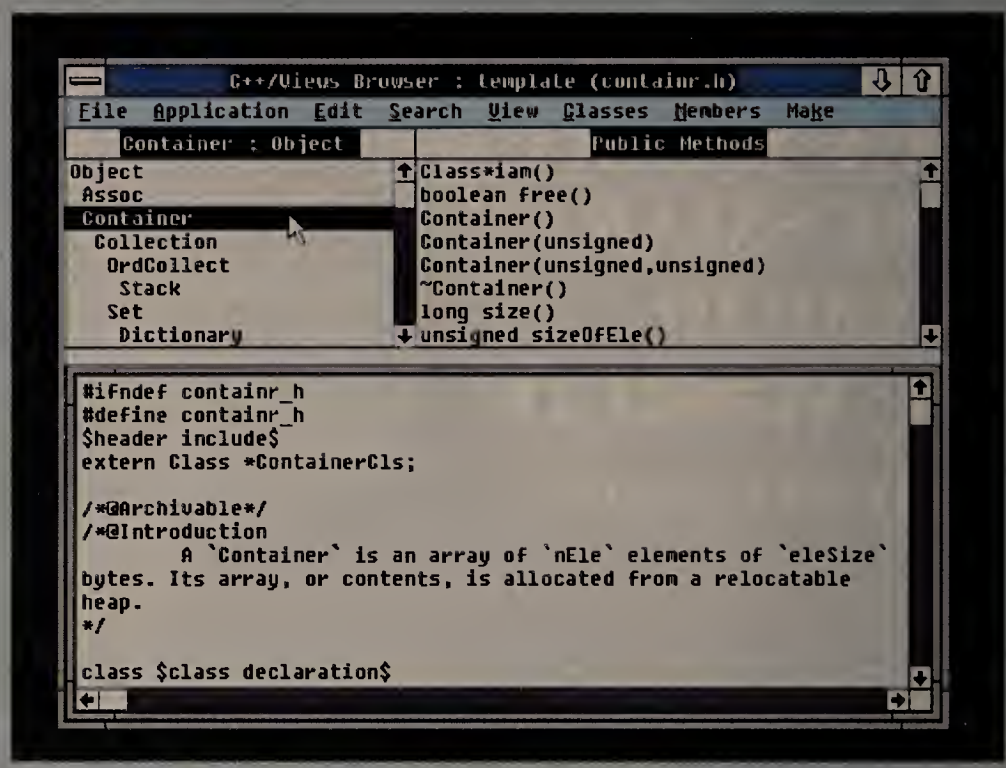
DEVELOPER'S TOOLBOX

Class Acts for C++ and Windows

At computer shows, what doesn't happen is often more significant than what does. And the surprise nonstarters last February, when Software Development '90 came to town, were Ray Duncan and Charles Petzold's "full-immersion" OS/2 tutorials. The center-ring events in Oakland, California, were canceled after only 11 developers decided to be immersed.

Contrast that with the intense interest in the competing sideshow lectures on C++, an object-oriented language that inventor Bjarne Stroustrup calls "a better C." According to one show official, demonstrating a finger snap that could tame a lion, seats for Bjarne's talks went "like that!"



C++/Views, with its object browser and editor, supplies the missing link between Windows and C++.

I'll let you draw your own conclusions. But if I were managing a software company in need of a growth market to exploit, these events would spell out the answer in plain English: *W-i-n-d-o-w-s*.

Why *Windows*? And why C++? Because developing *Windows* applications is a high-wire act that only the best C programmers can pull off without a safety net. C++ is that net. It's close enough to C to attract the interest of C artistes, and its object-oriented focus can reduce the complexity of writing *Windows* code —an event-driven three-ring circus that requires juggling menus, windows, and mouse cursors while performing your program's main act at the same time.

The trouble is, good C++ compilers are rarer than elephant trainers. Borland, Microsoft, and other companies hope to fill the gap with future C++ worlds of wonder, but they had better hurry. *Zortech C++ 2.0* is available now, and it's a talented performer that closely follows the AT&T 2.0 C++ specification. It supports multiple inheritance and one-step compilation, and it generates native code. It can handle regular C programs, and it runs like a bareback horse from the crack of a whip. And, yes, it does *Windows*.

Unfortunately, in that arena *Zortech C++* is not a solo performer. Missing from the compiler are the ropes that can raise the big tent of a full *Windows* application—a class library of base objects for accessing the complex routines and data structures in the *Microsoft Windows Software Development Kit*.

Then I spotted a new product, *C++/Views*, from CNS. This as-yet-unreleased library of 55 object classes for *Windows* developers supports *Zortech C++* and, I'm told, will later work with Borland's and Microsoft's C++. It comes with several supporting acts, such as an object browser, an interface generator, and a MAKE-file maker.

Although I haven't had the chance yet to get in the cage with *C++/Views*, I was impressed with a demo of the beta-test software at CNS's booth. But I was turned off by its $495 price—a ticket-scalping figure that other C++ object tool kits will surely beat before long. If you can wait for those products to appear, wait. But if you want to get a head start on developing *Windows* applications with C++, you'll find *C++/Views* and *Zortech C++* are two class acts that don't waste time clowning around.

Let's talk it over. My MCI Mail handle is TSWAN; my CompuServe ID is 73627,3241. —*Tom Swan*

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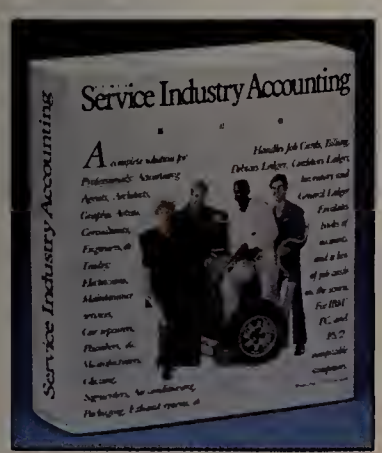

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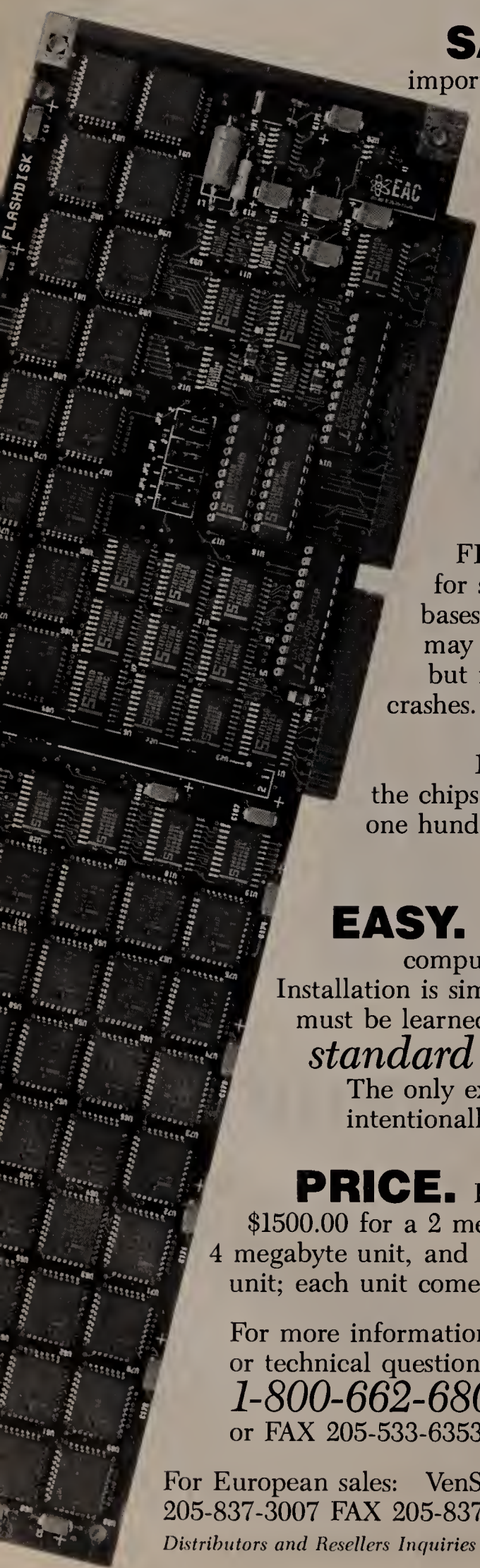

SAFE. The fear of losing important data can be eliminated because FLASHDISK is *nonvolatile*. No batteries are required. Data saved can withstand power losses and surges, vibrations, dust, humidity, and extreme temperatures. FLASHDISK can be removed and returned to a system without data loss or corruption.

ROWS. (Read Often Write Seldom) describes FLASHDISK which is perfect for software programs and data bases that are read intensive and may require occasional updating but need to be safe from system crashes. Write Seldom is descriptive because the write times are 1 megabyte per minute, and the chips have only been tested from one hundred thousand to one million rewrites without failure.

EASY. Any IBM compatible 16 bit computer can use a FLASHDISK. Installation is simple and no new commands must be learned because FLASHDISK uses *standard DOS commands*. The only exception is that once data is intentionally deleted, it is truly erased.

PRICE. FLASHDISK's retail price is $1500.00 for a 2 megabyte unit, $2700.00 for a 4 megabyte unit, and $4900.00 for an 8 megabyte unit; each unit comes with a one year warranty.

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DIGIPRO

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```
@echo off
call datetime
echo The date is %cdt%
echo The time is %ctm%
set cdt=
set ctm=
```

LISTING 6: TEST.BAT shows how you can use DATETIME.BAT.

```
echo off
if "%1"==""" goto noFileErr
if not exist %1 goto badFileErr
echo Press Enter to sort %1, or
echo type Ctrl-CY to quit now.
echo After sorting, the original
echo file's contents will be in
echo the file $$OLD.FIL.
echo.
pause
if exist $$old.fil del $$old.fil
sort < %1 > temp.$$$
rename %1 $$old.fil
rename temp.$$$ %1
goto end
:noFileErr
echo Error: No file named
goto instruct
:badFileErr
echo Error: File %1 not found
:instruct
echo Syntax: SORTBAK filename
:end
```

LISTING 7: SORTBAK.BAT sorts a text file and backs up the original data.

ment. Since time is always changing, always run DATETIME.BAT just before you use %cdt% *and* %ctm%.

A Backup of Sorts

DOS's SORT filter is troublesome to use. It requires sending the program's output to a temporary file, deleting the original, and then renaming the new file. To avoid those steps, I wrote a batch file, SORTBAK.BAT [see **LISTING 7**].

Type **sortbak** and the name of a text file to sort alphabetically. The file can list anything—names, parts, or wines in your cellar. For example, to sort a file

(continues)

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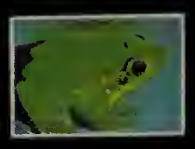

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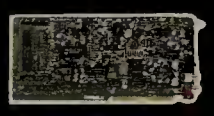

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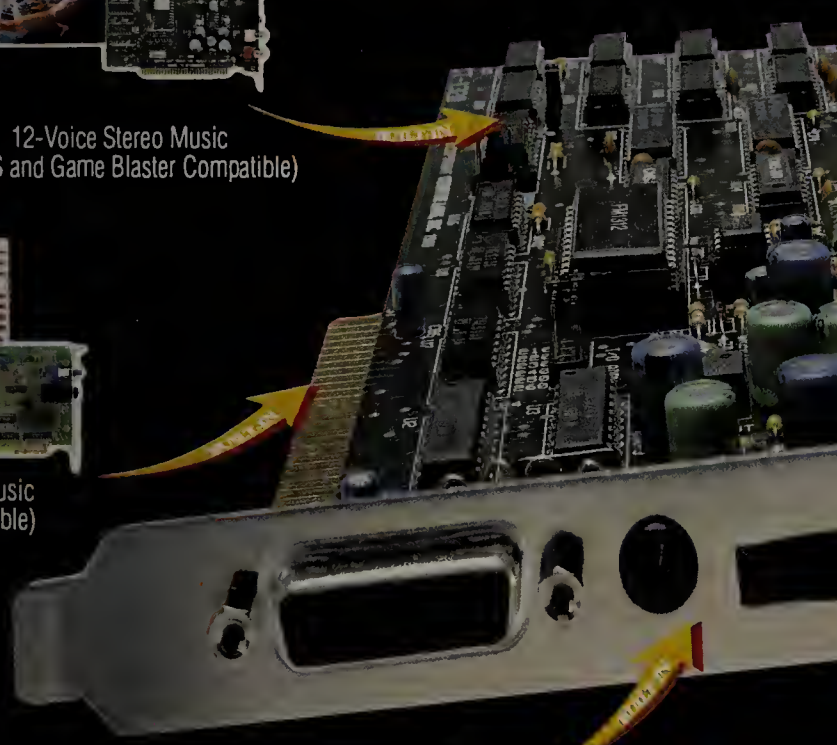

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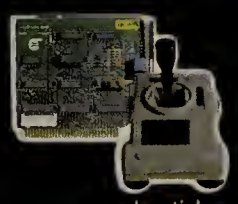

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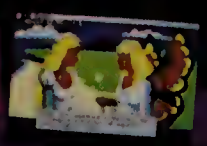

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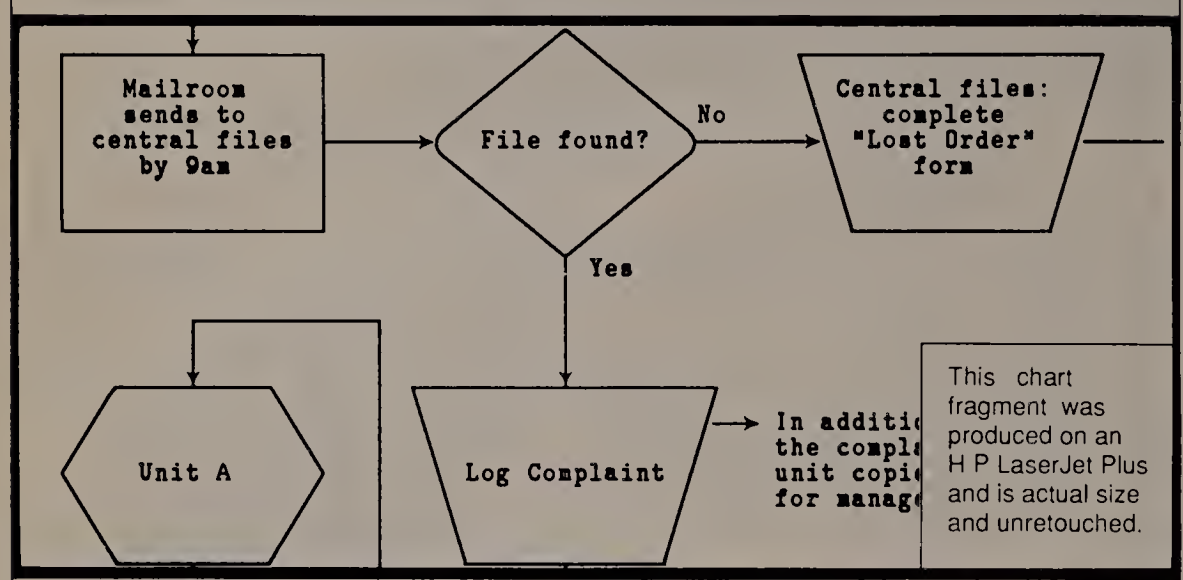

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named LIST.TXT by the first letter of each line, enter **sortbak list.txt**.

Glen Briggs
Duarte, California

Editor's note: SORTBAK.BAT and SORT.EXE must be in a directory listed in the current path. SORTBAK uses RENAME and a temporary file, TEMP.$$$, to sort a file and save the original contents in $$OLD.FIL. If you sort two files in a row, only the most recently sorted information is saved. The program displays instructions and pauses for you to strike a key. This pause lets you press **<Ctrl>-CY** *to quit before sorting begins.*

Clearing Old Directories

The batch file RDIR.BAT [see **LISTING 8**] uses a little-known DOS technique to automate the directory deletion tip in "Liquidating a Directory" [*Star-Dot-Star*, February 1990]. When you type **del** *dirname* to delete the files in a directory, DOS asks, 'Are you sure (Y/N)?' RDIR.BAT uses ECHO Y to answer that question for you.

Joel M. Wilson
Trenton, New Jersey

Editor's note: Copy RDIR.BAT to a directory in the current path. Use the program to remove directories plus (continues)

```
echo off
:loop
if "%1"==""" goto end
echo.
echo Directory %1 is
echo about to be deleted.
echo Press Ctrl-CY to cancel or
pause
echo Y | del %1 >nul
rd %1 >nul
shift
goto loop
:end
```

LISTING 8: RDIR.BAT removes directories and all the files they contain.

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any files they contain. For example, if the current directory has two subdirectories, TEMP1 and TEMP2, enter **rdir temp1 temp2** *to remove those directories and delete all their files. Remember that you cannot remove the current directory.*

If a subdirectory you attempt to remove contains other directories, you'll receive an 'Invalid path...' message. In that case, use CD to change to that first subdirectory and RDIR to remove all its subdirectories. If you receive the error message 'File not found', the directory was already empty when RDIR removed it.

Tom Swan is a contributing editor for PC World *and the author of several books, including* Mastering Turbo Pascal 5.5 *(Howard W. Sams and Co., Indianapolis, 1989).*

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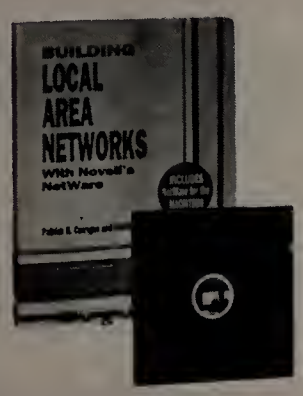

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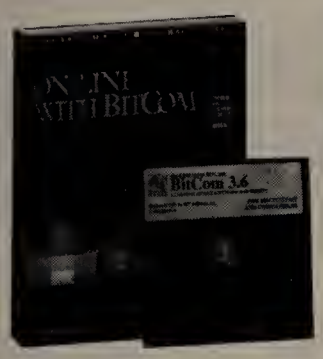

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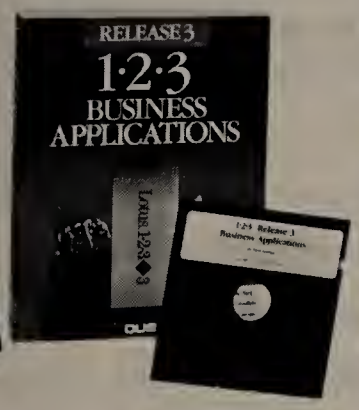

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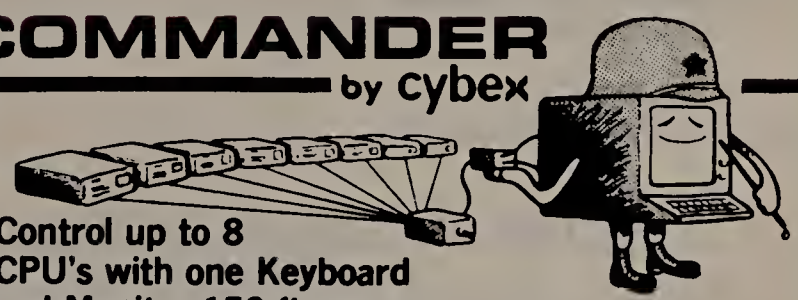

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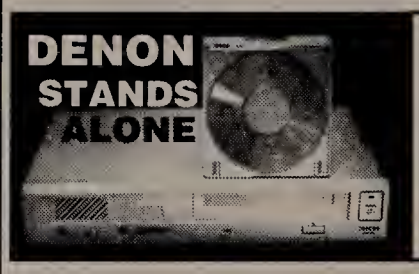

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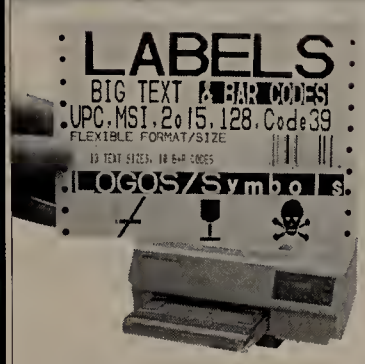

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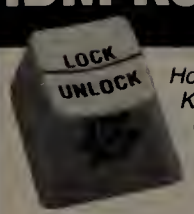

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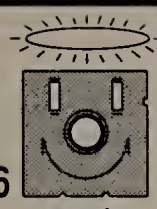

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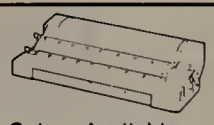

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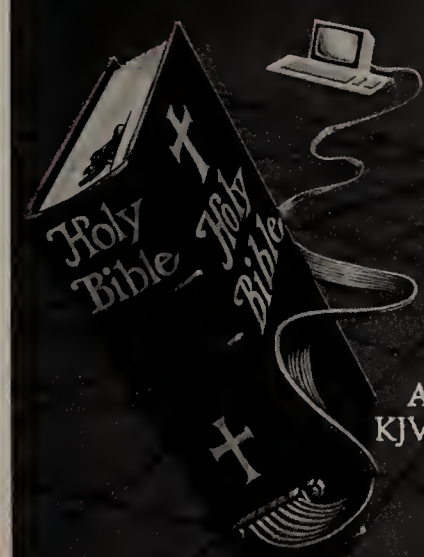

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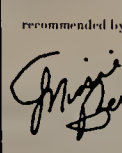

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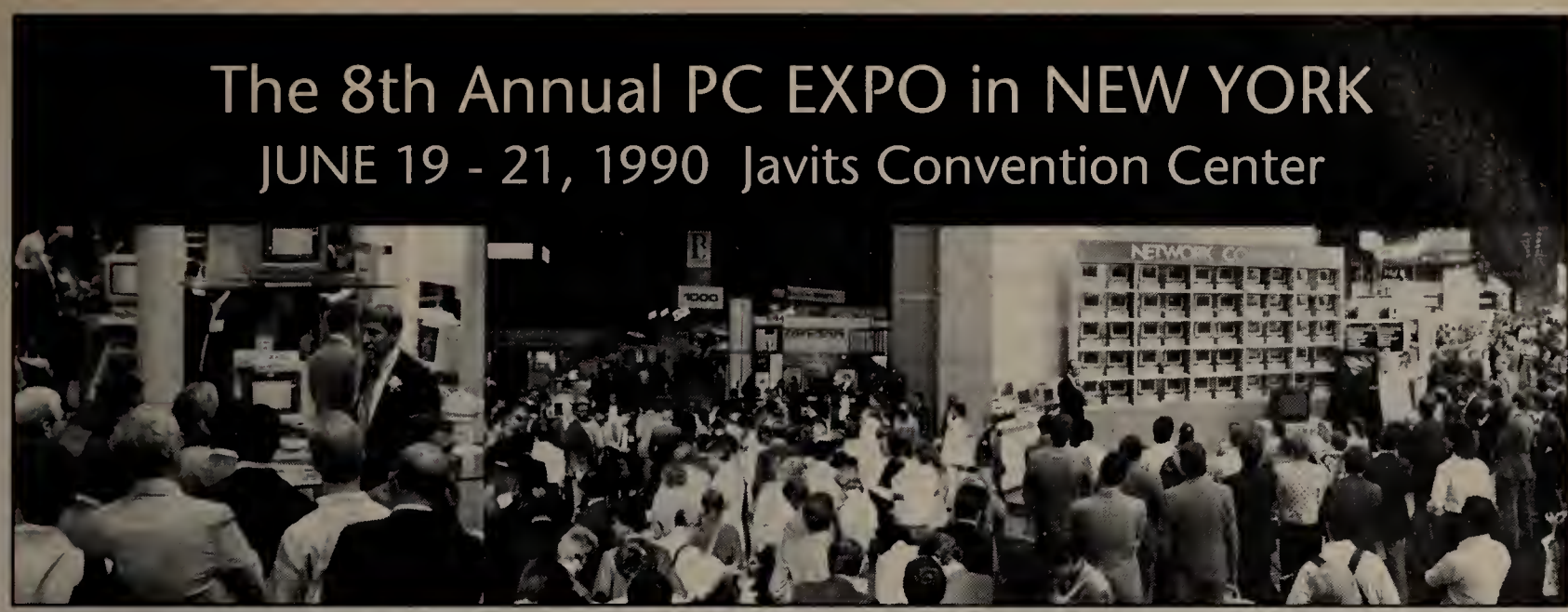
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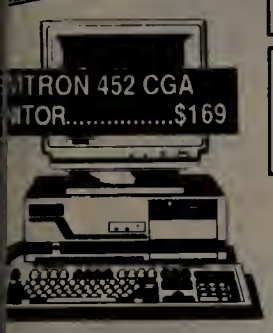

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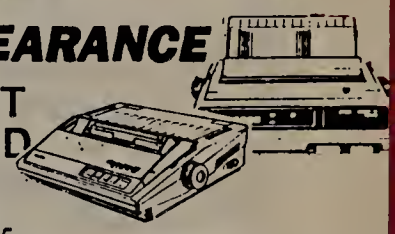

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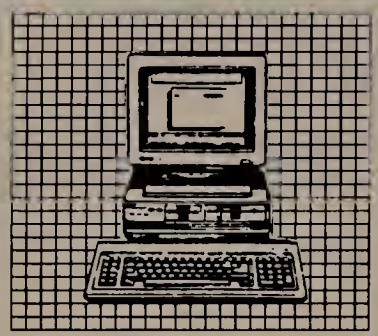

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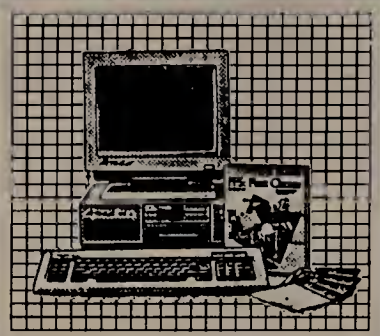

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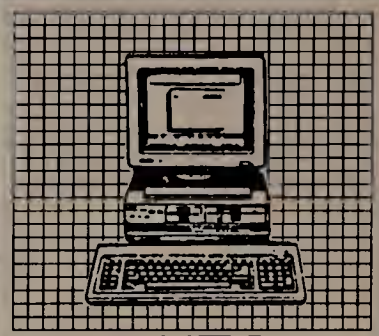

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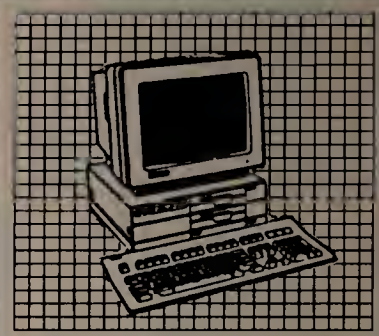

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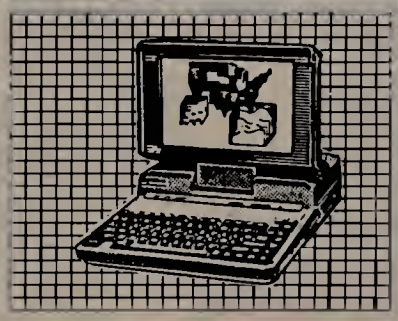

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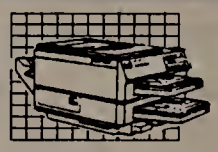

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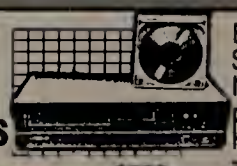

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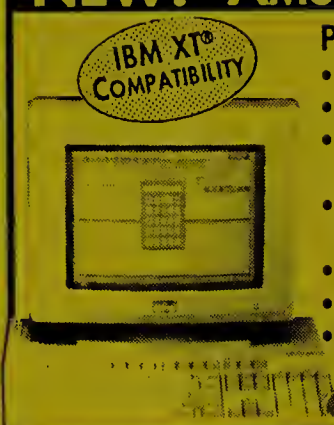

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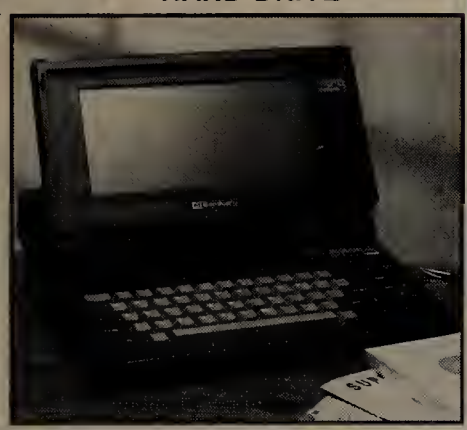

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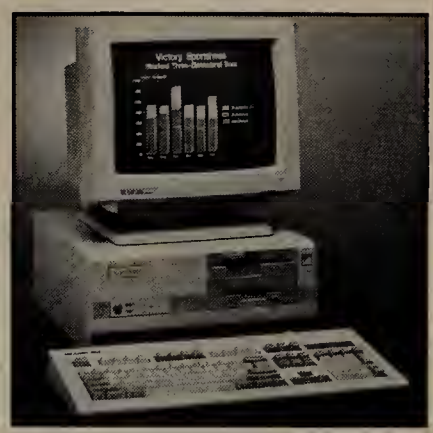

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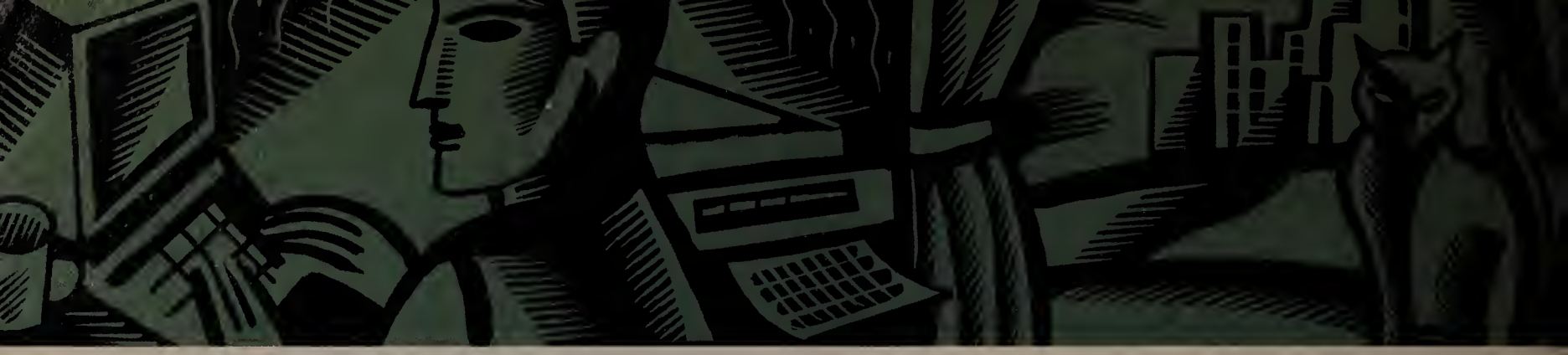

TAKING IT HOME

The practical guide to home/office computing

Work can be so far and yet so near.

Lawrence J. Magid

The first PC add-on most people reach for is a printer. But to me, a modem is a far more important peripheral. I'm not suggesting that the paperless office is here, but you'll find that being able to send and receive digital data is more useful than being able to print hard copy when you're working at home.

With a modem you can exchange electronic mail worldwide, grab files from your office's local area network, and gain access to data base services like CompuServe to pick up business news, market reports, demographic data, and even government census data. My modem turned out to be a lifesaver late one day when a radio station asked me to comment on a computer-related event that I hadn't heard about. After 20 minutes on line with CompuServe, I was able to call back and field the talk-show host's questions.

I love the freedom of being able to travel and work anywhere I want, delivering my articles electronically right at the deadline—not days before. My editors can easily make changes and send them back for my approval and further revision. Sometimes an article makes several round-trips in a day.

I have a friend who lives in San Francisco but works for a bank in the Philippines as a local area network consultant. His daily commute involves logging on to the bank's LAN to provide routine maintenance, install new software, add users, and check his mail. You can bet he's happy with his modem.

Of course, your office LAN has to have a modem gateway at the other end. If the office lacks a LAN gateway, you may be able to swap messages and files with company employees via MCI Mail, CompuServe, and other E-mail services.

Selecting a modem may seem daunting because of the multiplicity of protocols involved. Fortunately, most of them don't apply to the home-business user who sends only moderate-sized files. When selecting a modem, your main concern should be finding one that uses the Hayes AT command set—the standard protocol by which modems talk to communications software. Most vendors claim their products are 100 percent Hayes compatible, but a few are a little sloppy about it, so it wouldn't hurt to check a review or two before you buy (see "Nine MNP Modems for Corporate Communications," April 1990).

It's also important for your communications software to support popular error-checking protocols such as XMODEM, YMODEM, and Kermit. While you're at it, pick one that's easy to use and supports a descriptive dialing directory such as *Procomm Plus*, a PC World Best Buy.

Another key consideration is transmission speed. Don't bother with anything slower than 2400 bits per second unless you're truly an infrequent user. If you frequently send large files, you may want one of the faster 2400-bps modems offering built-in MNP-5 or V.42 bis error correction and data compression. When speaking with modems using the same protocol, MNP-5 modems can double throughput (speed), and V.42 bis modems can nearly triple it. This reduces telephone charges and saves you time. I doubt you'll need to spend the extra money for a 9600-bps modem unless you frequently send very large graphics or data base files.

Hayes's retail price for its standard Smartmodem 2400-bps external modem is $499, while its cheapest 9600-bps external modem costs $999. Hayes just began offering an under-$200 home/office bundle including its 2400-bps Personal Modem 2400plus (with a speaker) and Smartcom EZ software, but you can find a good Hayes compatible from Everex, Practical Peripherals, or Ven-Tel for under $150 through mail order.

You can save a little more money and desk space by using an internal modem. Personally, I prefer an external modem because I like to be able to check the status lights and use it with other computers.

What I like most of all about owning a modem is not having to make the two-hour round-trip to my office to retrieve the inevitable forgotten file. I just have an associate send it by modem. ●

Lawrence J. Magid is a nationally syndicated computer columnist.

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ANTHONY RUSSO

PC WORLD

Instant Reference Card #1

For use with PC World Instant Reference Card Portfolio

BASICS: DOS

What to do: To use the following DOS commands, exit your application so that the DOS prompt appears. You may see a drive letter (such as **A** or **C**), followed by a **>**. Many users have a prompt that shows the current drive and directory, such as **C:\DATABASE\FINANCES>**. At the DOS prompt, type the command plus any parameters, and press **<Enter>**.
Note: DISKCOPY, DISKCOMP, and COMP are "external" commands — DOS must load them from a disk. Make sure DISKCOPY.COM, DISKCOMP.COM, and COMP.COM are on your boot floppy or in a directory referenced in your system's PATH command.

LIST FILES

Command used: DIR

DIR	Lists all files in the current directory.
DIR A:	Lists all files in the default directory of drive A:.
DIR /P	Lists all files in the current directory, pausing one screen at a time.
DIR /W	Lists all files in the current directory in "wide," or five-column, format.

LIST FILES (continued)

DIR REPORT.TXT	Lists the file REPORT.TXT.
DIR *.TXT	Lists all files in the current directory with the TXT file extension.

Example: REPORT.TXT and PERSNNEL.TXT

DIR R*.*	Lists all files in the current directory with names starting with *R*.

Example: REPORT.TXT and ROI.WK1

DIR R???.TXT	Lists all files in the current directory that have four-letter names that start with *R* and end with the TXT file extension.

Example: READ.TXT and R2D2.TXT

DIR C:\DATABASE\FINANCES	Lists all files in the FINANCES directory regardless of the current drive and directory.

Tip: You can combine parameters.
Example: DIR *.DOC /W /P

Fold Here

COPY FILES

Command used: COPY

COPY C:REPORT.TXT A:	Copies REPORT.TXT to drive A:.
COPY *.* A:	Copies all files in the current directory to drive A:.
COPY C:\DATABASE\FINANCES\REPORT.TXT C:\ARCHIVE	Copies REPORT.TXT from one directory to another.
COPY REPORT.TXT A:OLD.TXT	Copies REPORT.TXT to the default directory of drive A: and renames it.
COPY C:\DATABASE\FINANCES D:	Copies all files in FINANCES directory to the default directory of drive D:.

Tip: To verify a copy, replace 'COPY' with **COMP** and press **<Enter>**.

COPY A FLOPPY DISK

Command used: DISKCOPY

DISKCOPY A: B:	Copies disk contents from floppy drive A: to floppy drive B:.
DISKCOPY A: A:	Copies contents of one floppy disk to another using the same floppy drive. You'll be prompted to switch source and target floppy disks.

Tip: To verify a copy, replace 'DISKCOPY' with **DISKCOMP** and press **<Enter>**.

Note: Target and source disks must have the same formatted capacity.

RENAME FILES

Command used: REN

REN REPORT.TXT FEB.DOC	Renames REPORT.TXT.
REN REPORT.TXT *.OLD	Renames REPORT.TXT's extension to OLD.
REN *.DOC *.LET	Gives all files in the current directory with the DOC extension the LET extension.
REN C:\DATABASE\FINANCES\REPORT.TXT *.SAV	Renames REPORT.TXT to REPORT.SAV regardless of the current drive and directory.

DELETE FILES

Command used: DEL or ERASE

DEL REPORT.TXT	Deletes REPORT.TXT from the current directory.
DEL *.TXT	Deletes all files with the TXT file extension in the current directory.
DEL *.*	Deletes *all* files in the current directory.
DEL C:\DATABASE\FINANCES	Deletes all files in the FINANCES directory regardless of the current drive and directory.
DEL C:\DATABASE*.WK1	Deletes all files in \DATABASE with the WK1 file extension.

Note: You can't use DEL to remove subdirectories. See "DIRECTORIES: NAVIGATE, MAKE, and REMOVE" on the other side of this card.

PC WORLD

Instant Reference Card #1

For use with PC World Instant Reference Card Portfolio

ADVANCED: DOS

What to do: To use the following DOS commands, exit your application so that the DOS prompt appears. You may see a drive letter (such as **A** or **C**), followed by a **>**. Many users have a prompt that shows the current drive and directory, such as **C:\DATABASE\FINANCES>**. At the DOS prompt, type the DOS command plus any parameters, and press **<Enter>**. **Note:** XCOPY, FORMAT, BACKUP, and RESTORE are "external" commands—DOS must load them from a disk. Make sure XCOPY.EXE, FORMAT.COM, BACKUP.COM, and RESTORE.COM are on your boot floppy or in a directory referenced in your system's PATH command.

DIRECTORIES: NAVIGATE, MAKE, AND REMOVE

Command used: CD (CHDIR), MD (MKDIR), RD (RMDIR)

Navigate:

CD FINANCES	Changes or "logs on" to the current directory's FINANCES subdirectory.
CD \DATABASE	Logs on to the DATABASE directory directly under the root directory (\).
CD \DATABASE\FINANCES	Logs directly on to the FINANCES directory under \DATABASE.

DIRECTORIES (continued)

CD..	Backs up to the "parent" directory immediately above.
CD\	Logs on to the default drive's root directory.

Make:

MD \DATABASE	Creates a "child" directory under the root of the default drive.
MD PAYROLL	Creates a new directory called PAYROLL under the current directory.
MD \DATABASE\PAYROLL	Creates a child directory beneath the existing \DATABASE directory.

Remove:

RD \DATABASE	Deletes the directory \DATABASE.

Note: You can't remove the directory you're in, any drive's default directory, or a directory that holds any files or directories.

Fold Here

COPY FILES AND DIRECTORIES

Command used: XCOPY

XCOPY C:\DATABASE D:\ARCHIVE /S
Copies all the files in \DATABASE and in its child directories to D:\ARCHIVE and recreates those directories under \ARCHIVE.

XCOPY C:\DATABASE A: /D:04-27-90
Copies all the files in \DATABASE created on or after 4/27/90 to drive A:.

Tip: You can combine parameters.
Example: XCOPY C:\DATABASE A: /S /D:01-10-90

Note: XCOPY is available only in DOS 3.2 and later versions.

FORMAT A FLOPPY DISK

Command used: FORMAT

FORMAT A: /S	Formats a bootable floppy to drive A:'s maximum capacity.
FORMAT A: /4	Formats a 360K floppy in a 1.2MB floppy disk drive.
FORMAT B: /N:9 /T:80	Formats a 720K 3½-inch floppy in a 1.44MB drive.

Tip: You can combine some parameters.
Example: FORMAT A: /S/4

Note: Don't format a 1.2MB floppy in a 360K drive, or a 1.44MB 3½-inch floppy (labeled HD or 2.0MB) in a 720K drive.

Fold Here

BACK UP A HARD DISK

Command used: BACKUP

BACKUP C:\ A: /S	Backs up all files and directories on drive C: to drive A:.
BACKUP C:\DATABASE\FINANCES A:	Backs up files in the FINANCES directory to drive A:.
BACKUP C:\ A: /M /S	Backs up only those files that have been modified since the last backup.
BACKUP C:\ *.WK1 A: /S	Backs up all WK1 files on drive C: to drive A:.

RESTORE A BACKUP

Command used: RESTORE

RESTORE A: C:\ /S	Restores all backed-up files to drive C:.
RESTORE A: C:\ *.WK1 /S	Restores all backed-up WK1 files to their original directories on drive C:.
RESTORE A: D:\DATABASE\FINANCES	Restores files backed up from C:\DATABASE\FINANCES to D: and recreates the directory structure.
RESTORE A: C:\ /M	Restores only files that have been modified since the last backup.

Note: The /M switch works only with MS-DOS, not PC-DOS.

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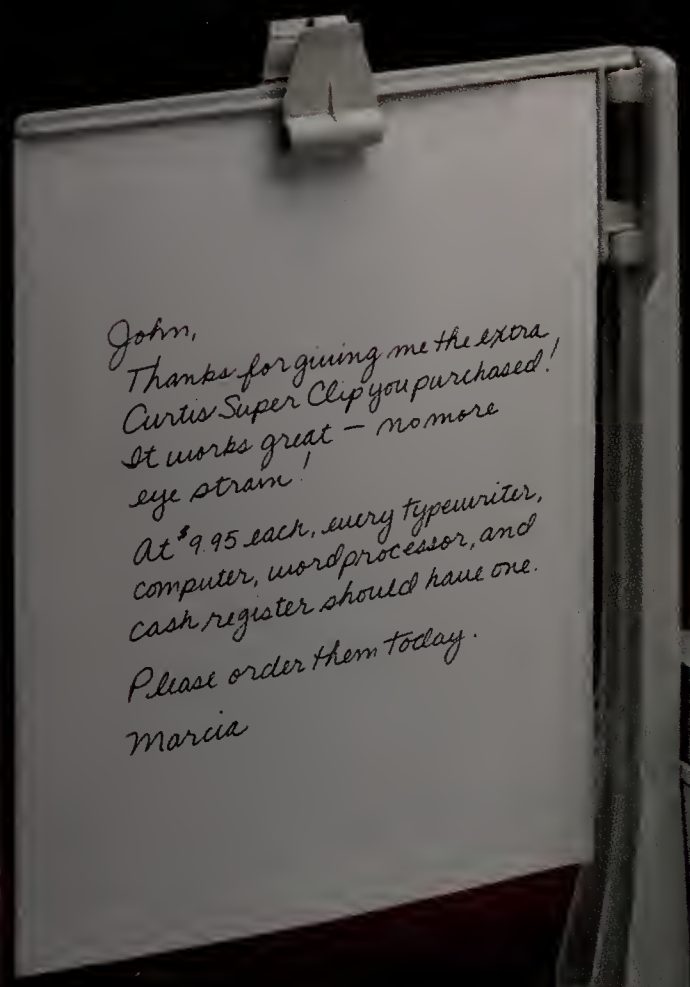

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